



Darrang College (Autonomous)

Tezpur-784001

Syllabus for 2-year Postgraduate Programme (NEP)

Sub: Geography

Approved by :

**Board of Studies meeting held on 12-06-2026 &
Academic Council vide Resolution no. DC/AC/3/2026/06 dated 29Th June 2026**

SYLLABUS

For 2 year PG programme (for students who completed 3-year UG Programme)

DARRANG COLLEGE (AUTONOMOUS), 2026

SUBJECT: GEOGRAPHY

(1st – 4th Semester)

(N.B: The Final syllabus is submitted to Academic Council Darrang College (Autonomous), which is prepared based on guidelines of NEP 2020 and Parent University, GU and approved by BoS, dated 12/06/2026)



P.G. DEPARTMENT OF GEOGRAPHY

DARRANG COLLEGE, TEZPUR

Website: www.darrangcollege.ac.in

Department email: geographydarrangcollege@gmail.com

Post Graduate Syllabus

Subject: Geography (3+2)

Programme specific outcomes (PSO)

PSO1. Post graduate students will be able to apply advanced knowledge of geomorphology, hydrology, remote sensing, GIS, quantitative techniques, surveying & indigenous knowledge system (IKS) to analyse geographical phenomena and environmental problems.

PSO2. Students will acquire skills in spatial data analysis, geospatial technologies & advanced statistical methods for geographical research & decision making.

PSO3. Students will develop the capacity to undertake independent research and contribute to the advancement of geographical knowledge.

PSO4. Students will acquire skills in regional planning, resource management & sustainable development for addressing contemporary socio-economic & environmental challenges.

Course Structure: L-T-P

Semester	Paper Type & Code	Paper title	Internal sem	End Sem	Total	Credit	L	T	P	Class hours
1	GGY-1-DSC-4014	Thoughts in Geography and Indian Knowledge System	20	80	100	4	3	1	0	60
	GGY-1-DSC-4024	Introduction to Hydrology	20	80	100	4	3	1	0	60
	GGY-1-DSC-4034	Practicals on Thoughts and Hydrology	20	80	100	4	0	0	4	60
	GGY-1-DSE-4044	(Optional 1) GGY-1-DSE-4044(A) Surveying Techniques / GGY-1-DSE-4044(B) (Optional 2): Applied Geomorphology	20	80	100	4	3	1	0	60
	GGY-1-FSC-4054	**Research Methodology in Geography	20	80	100	4	3	1	0	60
Total semester credit						20				
2	GGY-2-DSC-5014	Cartographic Methods & Techniques in Geography	20	80	100	4	3	1	0	60
	GGY-2-DSC-5024	Climatology & Biogeography	20	80	100	4	3	1	0	60
	GGY-2-DSC-5034	Practicals on Cartographic, Climatology & Biogeography	20	80	100	4	0	0	4	60
	GGY-2-DSE-5044	(Optional 1): GGY-2-DSE-5044(A)	20	80	100	4	3	1	0	60

		Health Geography/ (Optional 2): GGY-2-DSE-5044(B) Micro-Areas studies and regional analysis								
	GGY-2-FSC-5054	Advance Statistics in Geography	20	80	100	4	3	1	0	60
Total semester credit						20				
3 Group A(SPL)	GGY-3-DSC-5064 (A)	Remote Sensing, GIS & GPS	20	80	100	4	3	1	0	60
	GGY-3-DSC-5074(A)	Application of Remote Sensing, GIS & GPS	20	80	100	4	3	1	0	60
	GGY-3-DSC-5084(A)	Fundamental of spatial Information Technology	20	80	100	4	3	1	0	60
	GGY-3-DSC-5094(A)	Practicals on Remote Sensing, GIS & GPS	20	80	100	4	0	0	4	60
	GGY-3-DSE-5104	Fundamental of Research Ethics and Scientific research writing	20	80	100	4	3	1	0	60
Group B (SPL)	Total semester credit					20				
	GGY-3-DSC-5064 (B)	Population Geography: theories & global issues	20	80	100	4	3	1	0	60
	GGY-3-DSC-5074(B)	Population Geography: India & North-East	20	80	100	4	3	1	0	60
	GGY-3-DSC-5084(B)	Population and Migration	20	80	100	4	3	1	0	60
	GGY-3-DSC-5094(B)	Practical on Population Geography	20	80	100	4	0	0	4	60
	GGY-3-DSE-5104	Fundamental of Research Ethics and Scientific research writing	20	80	100	4	3	1	0	60

Group C(SPL)	Total semester credit					20				
	GGY-3-DSC-5064 (C)	Introduction to Regional Development Planning	20	80	100	4	3	1	0	60
	GGY-3-DSC-5074(C)	Regional Development Planning in India & SAARC Countries	20	80	100	4	3	1	0	60
	GGY-3-DSC-5084(C)	Rural development in India	20	80	100	4	3	1	0	60
	GGY-3-DSC-5094(C)	Practicals on Regional Development Planning	20	80	100	4	0	0	4	60
	GGY-3-DSE-5104	Fundamental of Research Ethics and Scientific research writing	20	80	100	4	3	1	0	60
Total semester credit						20				
4	GGY-4-PRJ-511-16	DISSERTATION (16 credits)				16				
		Dissertation/Thesis								
		Viva Voce								
		Field study								
	GGY-4-DSE-5124	Advanced Techniques in Geographic Research	20	80	100	4	3	1	0	60
Total semester credit						20				
Total credit						80 (20*4)				

****OR: To be adopted from SWAYAM-based online credit course (Research Methodology and IPR by Dr. G. Janardhanan, Professor, NITTTR Chennai)**

NB:

- Students will select any one of the two options provided in semester 1st and 2nd as a DSE course.

2. Students will select any of the three groups (A/B/C) as a special paper in 3rd Semester

First Semester

Title of the Course	Thoughts in Geography and Indian Knowledge System
Course Code	GGY-1-DSC-4014
Total Credit (theory)	4 (3-1-0)
Contact hours	60
Distribution of Marks	80+20 (End Semester + In Semester)
Course outcomes	1. Comprehend the historical evolution of geographical thought and identify key contributing figures and cultures. 2. Discuss the socio-political contexts affecting geographical theories and understand the effect of technology on geographical research. 3. Understand the application of an interdisciplinary approach to geography and the changing nuances of space and place. 4. Evaluate the shifts in geographical approaches and impact of methodologies on research. 5. Analyze the implications of climate change and future urban geography in geographical thought.

Unit	Content	Lecture (L)	Tutorial (T)	Practical (P)	Total Hours
Unit 1: Geographical Thought	Classical Philosophies: Ancient, Medieval. Age of Exploration and Discoveries and European	10	2	-	12

	renaissance on the emergence of modern Geography. Modern Period: Contribution of German (A. Von Humboldt, K Ritter, Ratzel), French: (Vidal De La Blache), British and American Geographers. Debates: Environmental Determinism, Possibilism, Systematic and Regional, Ideographic and Nomothetic. Paradigm Concept and paradigm shift in Geography				
Unit 2: Evolution of Geographic Thought	Environmental Determinism, Possibilism, Human Ecology, Chorology, Landscape & Locational Analysis, Areal differentiation. Quantitative revolution, Spatial analysis, Humanistic approach, Behaviouralism, Marxism, Concept of space and place in humanistic approach	10	2	-	12
Unit 3: Post Modern Geography	Socio- Spatial Dialectic in Geography, Post modernism Gender Geography Health Geography	10	2	-	12
Unit 4: Methodological Development	Qualitative and Quantitative methods in Geography Deductive and Inductive approach. Scientific laws, theories, model, hypothesis, probability. Mathematical modelling: Gravity model, spatial interaction model, spatial; diffusion. Geographic Information system (GIS) and spatial data analysis.	10	2	-	12

Unit V: Indian Knowledge System	• Meaning and concept of Indian Knowledge system (IKS) in Geography: source of ancient knowledge • Relationship between nature, humans and environment • Geography in Vedas, Puranas, Buddhist and texts • Description of Rivers, Mountains and Landscape • Contribution of Indian scholars/geographers in astrology and mapping, Earth movements, climate understanding • Traditional Environmental Knowledge: Water conservation and landuse practices, Forest and biodiversity conservation • Sustainable development and climate adaptation using traditional knowledge • Application of Indian Knowledge System in Environmental planning and resource management	10	2		12
Total		50	10	-	60

Reading List

1. Arentsen M., Stam R. and Thuijjs R., 2000: Post-modern Approaches to Space, ebook. 2. Bhat, L.S. (2009) Geography in India (Selected Themes). Pearson
2. Bonnett A., 2008: What is Geography? Sage.
3. Dikshit R. D., 1997: Geographical Thought: A Contextual History of Ideas, Prentice– Hall India.
4. Hartshorne R., 1959: Perspectives of Nature of Geography, Rand MacNally and Co.
5. Holt-Jensen A., 2011: Geography: History and Its Concepts: A Students Guide, SAGE.
6. Hussain, M., 1989: Evolution of Geographic Thought, Rawat Publications, Jaipur.
7. Johnston R. J., (Ed.): Dictionary of Human Geography, Routledge.
8. Johnston R. J., 1997: Geography and Geographers, Anglo-American Human Geography since 1945, Arnold, London.
9. Kapur A., 2001: Indian Geography Voice of Concern, Concept Publications.
10. Martin Geoffrey J., 2005: All Possible Worlds: A History of Geographical Ideas, Oxford.
11. Soja, Edward 1989. Post-modern Geographies, Verso, London. Reprinted 1997: Rawat Publ., Jaipur and New Delhi

Title of the Course	Introduction to Hydrology				
Course Code	GGY-1-DSC-4024				
Total Credit (theory)	4 (3-1-0)				
Contact hours	60				
Distribution of Marks	80+20 (End Semester + In Semester)				
Course outcomes	1. Understand the essential principles and scopes of hydrology, and the components and pathways of the hydrological cycle. 2. Proficient in hydrological data collection and recording techniques, and be able to implement these methods in models for resource management. 3. Develop insight into the processes of basin runoff, river flow, flood occurrences, their causes, effects, and manage associated issues. 4. Understand the characteristics of the water table, aquifers, groundwater flow, and exploration techniques, and evaluate contamination measures. 5. Analyze water resource management, sustainability issues, implications of climate change on hydrological systems, and evaluate relevant case studies.				
Unit	Content	Lecture (L)	Tutorial (T)	Practical (P)	Total Hours
Unit I: Introduction to Hydrology	Meaning and Scope of hydrology; Importance of hydrological studies in geography.	10	2	-	12
	Hydrological cycle: Components and water flow pathways- precipitation, infiltration,				

	evaporation, transpiration, surface runoff, storage, through flow, ground water flow; Water distribution on the earth and the water budget.				
Unit II: Hydrological Measurement and Data Analysis	Hydrological Data collection and recording techniques: Rainfall Measurement, Stream flow measurements from stream gauging stations; Evapotranspiration measurement methods, Groundwater level measurement methods.	10	2	-	12
Unit III: Surface Water Hydrology	Concept of basin runoff; Factors affecting basin runoff; Sources of river flow, Types of flow, Factors causing river flow variation; Concepts of water discharge, Effects of water discharge on channel morphology, measurement of discharge & velocity, Hydrograph and its components, unit hydrograph. Flood hydrology: Definition and causes of flood; Flood occurrence pattern- seasonality and frequency; flood frequency analysis, flood hydrograph. Anthropogenic activities and impact on River hydrology	10	2	-	12
Unit IV: Groundwater Hydrology	Concept of water table and the aquifer: Aquifers classification (confined, unconfined and leaky), fluctuation of groundwater table, groundwater movement and recharge Sustainable groundwater use.	10	2	-	12
Unit V: Hydrological Issues and Water shed Management	Watershed management and planning and sustainability; Impact of climate change on hydrological systems.	10	2	-	12

	Case studies on water management policies and their effectiveness.				
Total		50	10	-	60

Reading List:

1. Madan Mohan and Mimi Das Saikia, 2009, Hydrology , PHI Learning Pvt. Ltd Subramanya, K. (2013). Engineering hydrology, 4e. Tata McGraw-Hill Education. Chorley, R. J. (Ed.). (2019). Introduction to fluvial processes. Routledge. Brutsaert, W. (2005). Hydrology: an introduction. Cambridge University Press.
2. Maidment, D. R. (1993). Handbook of hydrology (Vol. 9780070, p. 397323). New York: McGraw-Hill. Te Chow, V. (2010). Applied hydrology. Tata McGraw-Hill Education.
3. Davie, T. (2008). Fundamentals of hydrology. Routledge.
4. Sharp, J. J., & Sawden, P. G. (2013). BASIC hydrology. Elsevier. Dingman, S. L. (2015). Physical hydrology. Waveland press. Lane, B. (2002). Statistical Methods in Hydrology.
5. "Principles of Hydrology" by R. Ward and M. Robinson.
6. "Applied Hydrology" by V.T. Chow, D.R. Maidment, and L.W. Mays. Access to hydrological databases and software for practical exercises

Title of the Course	Practicals on Thoughts and Hydrology
Course Code	GGY-1-DSC-4034
Total Credit (Practical)	4 (0-0-4)
Contact hours	60
Distribution of Marks	80+20 (End Semester + In Semester)
Course outcomes	1. Comprehend the historical evolution of geographical thought and identify key contributing figures and cultures. 2. Discuss the socio-political contexts affecting geographical theories and understand the effect of technology on geographical research. 3. Understand the application of an interdisciplinary approach to geography and the changing nuances of space and place. 4. Evaluate the shifts in geographical approaches and impact of methodologies on research. 5. Analyze the implications of climate change and future urban geography in geographical thought.

Practical

Unit	Content	Lecture (L)	Tutorial (T)	Practical (P)	Total Hours
	1. Mapping of routes of exploration and discoveries (Marco Polo, Christopher Columbus, Vasco-da Gama, and James Cook) (1 Exercise)	-	-	2	4
	2. Intensity of spatial interaction of Guwahati city				

Unit 1: Practical on Thoughts	with neighboring urban centers. (1 Exercise)			3	6
	3. Mapping of population potential surfaces in Assam using the Gravity Model. (1 Exercise)			2	4
	4. Demarcation of urban influence zone by using Reilly's breaking point formula. (1 Exercise)			1	2
	5. Population Density gradient analysis of urban areas. (1 Exercise)			2	4
	6. Trend of development of paradigms in geography (from Environmental Determinism to Post Modernism) through time-scale graph indicating advocates, tentative time of emergence and overriding theme. (1 Exercise)			2	4
	7. Preparation of a world map highlighting the major developments of geography (Greek, Arab, France, Germany, Russia, UK and USA) indicating the contribution, name of the contributor and year of contribution. (1 Exercise)			1	2
	8. Greek and Arabian contributions to the development of Geography in different ages (Name of contributor and name of contribution at different points of time) through time-scale graph. (1 Exercise)			2	4
Total		-	-	15	30

Practical

Unit	Content	Lecture (L)	Tutorial (T)	Practical (P)	Total Hours
Unit 2: Practical on Hydrology	1. Estimation of runoff from daily water discharge data and to compare the seasonal variation patterns of basin runoff taking i. Two major tributaries of Brahmaputra River, one north bank and one south bank tributary and also taking ii. Two months - one winter and one summer months (December and July) (2 Exercises)	-	-	3	6
	2. Preparation of discharge hydrographs and analyse the trend of discharge pattern in the rivers. (2 Exercises)			2	4
	3. Preparation of stage-discharge hydrograph of Brahmaputra at any two gauge sites for a particular year and to compare the patterns in discharge and stage variations in the river. (2 Exercises)			2	4
	4. Construction of stage-discharge rating curves separately for all months of the year, for monsoon months (may to October) and for non-monsoon months (November to April taking monthly average data of a period of 5/10 years for			3	6

	Brahmaputra or one of its major tributaries and to analyse the seasonal relationship pattern between stage and discharge. (2 Exercises)				
	5. Preparation of rainfall variability maps and analyse the rainfall variability pattern. (1 Exercise)			1	2
	6. Collection and mapping of monthly /seasonal fluctuation data of ground water level of selected wells (at least 10) in a locality (village/ward). (1 Exercise)			2	4
	7. Construction of storm hydrograph for monsoon period.			2	4
Total		-	-	15	30

Title of the Course	Surveying Techniques (Optional 1)
Course Code	GGY-1-DSE-4044 (A)
Total Credit (theory)	4 (3-1-0)
Contact hours	60
Distribution of Marks	80+20 (End Semester + In Semester)
Course outcomes	1. Understand the meaning, types, and significance of field surveying 2. Learn the principles of plane, geodetic surveying and triangulation 3. Master the principles and techniques of several surveying tools 4. Gain proficiency in methods of radiation, intersection, traversing, contouring and leveling in surveying 5. Understand the basics of GPS, its principles and applications

Unit	Content	Lecture (L)	Tutorial (T)	Practical (P)	Total Hours
Unit I	Field surveying : Its meaning, types and significance in geography; Principles of surveying: plane and geodetic surveying; Principles of triangulation	10	2	-	12
Unit II	Principles and Techniques of surveying: Principles and Techniques of surveying by Plane Table, Prismatic Compass, Theodolite, Dumpy Level and Total Station	10	2	-	12
Unit III	Methods of Surveying: Methods of radiation, intersection, traversing, contouring and leveling in	10	2	-	12

	surveying				
Unit IV	GPS: Basic concept, principles and utilities	10	2	-	12
Unit V	Various tools and techniques of socio-economic survey (Questionnaire, schedule, resource inventory, transect chart, PRA, top-down and bottom-up approach, various sampling techniques	10	2		12
Total		50	10	-	60

Reading List

1. Campbell, J., 1984: Introductory Cartography, Prentice Hall Inc., Englewood Cliff.
2. Misra, R.P. and Ramesh, A., 1995: Fundamentals of Cartography, Concept Publishing Company, New Delhi.
3. Robinson, A.H., et al: Elements of Cartography, John Wiley Sons, New York. Raisz, E.: Principles of Cartography, McGraw Hills, London.
4. Kenetkar, T.P. and Kulkarni, S.U.: Surveying and Levelling, Vol. I II, Vidyarthi Gritha Prakashan, Pune.
5. Das, A.K. 2021: Pocket Size Handbook on Handling of GPS for Field Studies, GTAD and Aranyak, Guwahati (In PDF format).

Title of the Course	Applied Geomorphology (Optional 2)
Course Code	GGY-1-DSE-4044 (B)
Total Credit (theory)	4 (3-1-0)
Contact hours	60
Distribution of Marks	80+20 (End Semester + In Semester)
Course outcomes	1. Ability to interpret landforms for practical purpose 2. Understanding of geomorphic hazards 3. Competence in geomorphic mapping 4. Enhance ability to apply process based knowledge

Unit	Content	Lecture (L)	Tutorial (T)	Practical (P)	Total Hours
Unit 1	Pure and Applied Geomorphology: Applied Geomorphology, paleogeomorphology, Hydro Geomorphology, Environmental Geomorphology, Quantitative Geomorphology, Application of Geo- Spatial technology in Geomorphology, Qualitative Geomorphology	13	2	-	15
Unit 2	System concept in Geomorphology: closed and Open system, Steady state and	12	3	-	15

	Dynamic equilibrium, Quasi-equilibrium, Geomorphic Threshold, Methods of analysis in Applied Geomorphology Morphogenetic Regions				
Unit 3	Drainage Basin: Drainage Basin Morphometry. Water Storage and Flow: Storage, Surface and sub surface run off and Ground water transport by stream. Stream flow and channel slope. Erosion, Transportation and Feedback relationship.	13	2	-	15
Unit 4	Slopes: Weathering, Slope Process, Slope forms and slope analysis, Dynamic equilibrium. Geomorphic Hazards and management: Basic concept of hazard, Vulnerability, Risk Analysis and risk reduction. Types, Soil erosion, River Flood, Slope Instability, Earthquakes Control of soil erosion by water, control and mitigation of river flood, landslides hazard management	12	3	-	15
Total		50	10	-	60

Reading Lists

1. Geomorphology: Pure and Applied by M G Hart, pub: Allen and Unwind (publishers) Ltd, UK
2. Geomorphological Techniques edited by Andrew Goudie et al , Routledge London and New York
3. Fundamentals of Fluvial Geomorphology by Ro Charlton, Routledge
4. The Basics of Geomorphology by K J Gregory and John Lewin, Sage
5. Fluvial Forms and Processes by David Knighton, Pub:Arnold- Heinemann
6. Principles of Geomorphology by W D Thornbury, Wiley Eastern Limited
7. Fluvial Processes in Geomorphology by Luna B Leopold, M Gordon Wolman and John P Miller Pub: S Chand and Company

Title of the Course	**Research Methodology in Geography
Course Code	GGY-1-FSC-4054
Total Credit (theory)	4 (3-1-0)
Contact hours	60
Distribution of Marks	80+20 (End Semester + In Semester)
Course outcomes	1. Understand the role and significance of geographic research, be able to evolve research problem and review literature. 2. Design an effective geographic research proposal, understand sources and types of geographical data, and learn primary data processing techniques. 3. Analyze quantitative and qualitative geographical data using software and understand the significance of geospatial data analysis and GIS. 4. Ability to write a research paper and present geographic research effectively while understanding ethical considerations in research. 5. Update on recent advances in geographic research, innovative data collection methods and understanding the role of big data, integrating IKS in geographic research.

Unit	Content	Lecture (L)	Tutorial (T)	Practical (P)	Total Hours
Unit 1: Introduction to Research in Geography	Geographic research: Definition and characteristics; Domain of geographic research and its relation with other allied fields; significance of geographic research. Types of geographic research: Basic &	10	2	-	12

	Applied, Qualitative & Quantitative, Longitudinal, Cross-sectional and Comparative Evolving a research problem; Identifying research gaps; Formulating objectives and research questions Review of Literature and its need; Sources of geographical literature (Journals, books and online sources)				
Unit 2: Research Design and Methodology	Designing a geographic research proposal (Statement of the problem, Review of research works, Objectives, Research questions, Hypotheses, Database and methodology, Significance, Organization of the work and References). Types of research designs (experimental, quasi-experimental, non-experimental) Nature of geographical data (Physical geographic and human geographic data; Spatial and non-spatial data); Sources of geographical data: Primary (Pilot survey, Field survey, Household survey, interview, field observation, focus group discussion), Secondary (Census, NFHS, NSS, Remote Sensing, Maps and various govt. agencies), and Tertiary (Research articles,	10	2	-	12

	books, reports, etc). Sampling Techniques: Probability and non-probability sampling; Sample size determination Primary data processing techniques: Manual and Computer-based using software like MS Excel, SPSS, R, etc.				
Unit 3: Data Analysis in Geography	Quantitative Data Analysis: meaning and significance Statistical methods in geography (Application of the measures of central tendency, dispersion, correlation, regression, etc; Time series analysis; Spatial statistics). Use of software for data analysis (MS Excel, SPSS) Qualitative Data Analysis: Meaning and significance Techniques of analyzing qualitative data (Content analysis, thematic analysis, perception analysis, etc) Significance of geospatial data analysis and GIS in geographical research	10	2		12
Unit 4: Writing and Presenting Geographic Research	Research Paper Writing: Structure of a research paper (Abstract including key words, Introduction, Objectives and research questions, Database and methodology, Analysis and discussion, Findings and conclusion, References), a case study of local area. Academic writing styles and referencing system	10	2		12

	Presentation Skills: Preparing slides and posters for geographic presentations; Oral presentation techniques Ethical Considerations in Research; Ethical issues specific to geographic research obtaining ethical clearances and handling sensitive data Structure of a Research Report: Preliminaries, Text, Tables, Figures and Appendices; Citations, References and Bibliography; Research/Project Report Writing; Executive Summary.				
Unit 5: Conducting Advanced Geographic Research	Recent Advances in Geographic Research New methodologies in spatial analysis Innovations in data collection , Spatial modelling and Predictive analysis in geography The role of big data in geographic research Funding Opportunities in Geographic Research and Preparing Grant Proposal	10	2		12
Total		50	10		60

Reading List

1. Creswell, J. W., & Creswell, J. D. (2017). Research design: Qualitative, quantitative, and mixed methods approach. Sage publications.
2. Engel, R. J., & Schutt, R. K. (2016). The practice of research in social work. Sage Publications."Qualitative Inquiry and Research Design: Choosing Among Five Approaches" by John W. Creswell
3. Steinberg, S. L., & Steinberg, S. J. (2015). GIS research methods: incorporating spatial perspectives.
4. Gomez, B., & Jones III, J. P. (Eds.). (2010). Research methods in geography: A critical introduction (Vol. 6). John Wiley & Sons.
5. Nayak, A., & Jeffrey, A. (2013). Geographical thought: An introduction to ideas in human geography. Routledge."Statistical Methods for Geography: A Student's Guide" by Peter A. Rogerson

OR

GGY-1-FSC-4054: **To be adopted from SWAYAM-based online credit course (Research Methodology and IPR by Dr. G. Janardhanan, Professor, NITTTR Chennai)

Second Semester

Title of the course	Cartographic Methods & Techniques in Geography
Course code	GGY-2-DSC-5014
Total Credit (theory)	4 (3-1-0)
Contact hours	60
Distribution of Marks	80+20 (End Semester + In Semester)
Course outcomes	1. Understand what methods to use for geographical data analysis. 2. Understand the principles of surveying and mapping.

Unit	Content	Lecture (L)	Tutorial (T)	Practical (P)	Total Hours
Unit 1	History and Development of cartography, traditional and digital cartography. Sources of cartographic data, Cartographic techniques and methods in preparation of diagrams & maps	10	2	-	12
Unit 2	Earth's spherical properties, The earth: its shape and size, coordinate reference system, map scale	7	2	-	9
Unit 3	Principles of surveying; field techniques (Triangulation, traversing & leveling) and mapping	8	1	-	9
Unit 4	Principles of mapping; base map preparation, concepts of point, line & area; concept of generalization, scale factor,	10	2	-	12

	choice of map projection (Zenithal, Conical, cylindrical & conventional); map design & layout				
Unit 5	Classification of map, Thematic mapping: meaning and type; principles of thematic mapping, basic of ideas of isopleths, choropleth, and choro-chromatic mapping	8	2	-	10
Unit 6	Techniques of physical and socio-economic data representation & mapping	7	1	-	8
Total		50	10		60

Reading list:

Bygott, J.: An Introduction to Map Work and Practical Geography.
Campbell, J.,1984: Introductory Cartography, Prentice Hall Inc., Englewood Chiffs, N.J.
Cuff, D.J. and Mattson, M.T., 1982: Thematic Maps: Their Design and Production, Methuen, New Work.
Kanetkar, T.P. and Kulkarni, S.U.: Surveying and Levelling, Vol. I & II, Vidyarthi Gritha Prakashan, Pune.
Kellaway, G.P.: Map Projections, Methuen & Co., London
Lawrence, G.R.P.,1964: Cartographic Methods, Oxford University Press, London.
Lewis, P., 1967: Maps and Statistics, Methuen & Co. Ltd., London
Misra, R.P. and Ramesh, A.,1995: Fundamentals of Cartography, Concept Publishing Company, New Delhi.
Monkhouse, F.J. and Wilkinson, H.R.,1989: Maps and Diagrams, B.I. Publications, New Delhi.
Nag, P., 1992: Thematic Cartography and Remote Sensing, Concept publishing Co., New Delhi.
Nag, P. and Kudra, M., 1998: Digital Remote Sensing, Concept Publishing Co., New Delhi.
Patel, A.N. and Singh, S., 1999: Principles of Remote Sensing, Scientific Publishers (India), Jodhpur.
Raisz, E.: General Cartography, McGraw Hill Co., London.
Raisz, E.: Principles of Cartography, McGraw Hill Co., London.
Robinson, A.H., et al: Elements of Cartography, John Wiley & Sons, New York.
Singh, R.L.: Elements of Practical Geography, Kalyani Publishers, New Delhi.
Steers, J.A., 1965: An Introduction to the Study of Map Projection, University of London, London.

Title of the course	Climatology & Biogeography
Course code	GGY-2-DSC-5024
Total Credit (theory)	4 (3-1-0)
Contact hours	60
Distribution of Marks	80+20 (End Semester + In Semester)
Course outcomes	1. Knowledge about different phenomena of weather and climate specially vagaries of Indian monsoon and techniques of weather forecasting; 2. Deeper understanding of plant-animal association in varying habitats and environments; 3. Practical utility in the field while carrying out research on issues of climate and biogeography. 4. Evaluate the impact of climate change on biosphere.

Unit 1	Climatology (48 marks)	Lecture (L)	Tutorial (T)	Practical (P)	Total Hours
1	Defining the field of Climatology; Importance of Climatology in geographical studies; Factors affecting the distribution of insolation on the globe, Insolation; atmospheric temperature; horizontal and vertical distribution of temperature	8	2	-	10
2	Atmospheric Pressure and Global Wind System: Vertical pressure gradient and horizontal pressure system; Surface winds, stratospheric winds, seasonal and	8	2	-	10

	local winds; Air masses and Fronts: Characteristics, Origin and modification of air masses, stability and instability				
3	Extreme weather events: Cyclones, anticyclones, cloud bursts, drought; Classification of World Climate: Schemes of Koppen, Thornthwaite, & Trewartha	8	2	-	10
4	Monsoons: Mechanism of development, Distribution of monsoons, Trajectories and Irregularities, Effects of El-Nino; Techniques of weather forecasting: conventional and modern	8	1	-	9
Unit 2	Biogeography (32 marks)				
1	Introduction to Biogeography: Meaning, nature, scope of biogeography and approaches (Evolutionary & Ecological); Bio-energy cycles and food-chain	6	1	-	7
2	Habitat, Environment and Ecosystem; Plant-Animal Association in varying habitats and environments Soil characteristics and their significance	6	1	-	7
3	Concept of Bio-diversity; Conservation of forest and wild life; National forest and environment policies	6	1	-	7
Total		50	10		60

Reading list:

Climatology

Barry, R.G. and Chorley, R.J., 1998: Atmosphere, Weather and Climate, Routledge, New York.

Critchfield, H.J., 1975: General Climatology, Prentice Hall of India, New Delhi.

Blair, T.A., 1954: Weather Elements, Prentice-Hall.

Das, P.K., 1968: The Monsoons, National Book Trust, New Delhi.

Griffith, J.F., 1966: Applied Climatology, Oxford University Press.

Hobbs, J.E., 1980: Applied Climatology, Butterworths.

Lal, D.S., 1998: Climatilogy, Sharda Pustak Bhawan, Allahabad.

Lockwood, J.G., 1976: World Climatology: Environmental Approach, Edward Arnold Ltd., 41 Bedford Square, Wc IB 3 Dq.
Lydolph, Paul, E., 1985: The Climate of the Earth, Rawman and Totowa, N.J.
Miller, A. A., 1953: Climatology, Dutton.
Rumney, George, R., 1968: Climatology and World's Climates, McMillan, London.
Strahler, A.N., 1971: Physical Geography, John Wiley, New York
Stringer, E.T., 1982: Foundations of Climatlogy.
Hoirn, L.A., 1980: An Introduction to Climate, International Series.
Trewartha, G.T. and Horn, L.A., 1980: An Introduction to Climate, International Series.
Oliver, J.E. and Hiddore, J. J., 2002: Climatology: An Atmospheric Science, Pearson Education, Delhi.

Biogeography

Bhattacharyya, N.N., 2003: Biogeography, Rajesh Publications, New Delhi.
Bradshaw, M.J., 1979: Earth and Living Planet, ELBS, London. Bunting,
Goudie, Andrew, 1981: The Human Impact, Basil Blackwell, Oxford.
Hussain, M. (ed), 1994: Biogeography (Part I&II), Anmol Publications Pvt. Ltd. New Delhi.
Newbegin: Plant and Animal Geography.
Odum, E.P., 1977: Ecology.
Robinson, H., 1982: Biogeography, E.L.B.S., Mc Donald & Evans, London.
Russell, E.W., 1973: Soil Condition and Plant Growth, Long man, London.
Smith, R.L., 1977: Ecology of Man-An Ecosystem Approach.
Simmons, I.G., 1974: Biogeography: Natural and Cultural, London.
Tiby, 1982: Biogeography, Longman.

Title of the Course	Practicals on Cartographic, Climatology & Biogeography
Course Code	GGY-2-DSC-5034
Total Credit (practical)	4 (0-0-4)
Contact hours	60
Distribution of Marks	80+20 (End Semester + In Semester)
Course outcomes	1. Practical utility in the field while carrying out research on cartographic techniques, climatological models and field based investigation of biogeography

Unit 1	Cartographic techniques (30 marks)	Lecture (L)	Tutorial (T)	Practical (P)	Total Hours
1	Traversing and topographic surveying with the help of prismatic compass and theodolite. (3)	-	-	3	6
2	Contouring and profile levelling with the help of dumpy level. (2)	-	-	2	4
3	Construction of map projections (3) (i) Zenithal gnomonic (Equatorial case) (ii) Lambert's conical equal-area projection (iii) Gall's cylindrical stereographic projection (iv) Mollweide projection	-	-	4	8
4	Map reading and analysis, preparation of base map. (2)	-	-	2	4
5	Representation of physical and socio-economic data using sphere diagram, flow chart, isolines and transect chart. (4)	-	-	4	8
Total				15	30
Unit 2	Climatology (30 marks)				
1	Climograph, Hythergraph and Ergograph (3 Assisgnments)	-	-	6	12

	Rainfall dispersion graph, rainfall variability and equipluve maps.(3 Assignments) Water deficiency and surplus graphs (2 Assignments)				
Total				6	12
Unit 3	Biogeography (20 marks)				
1	1. Identification of an Ideal Soil layers using a model (1 Assignment) 2. Mapping on Key Biodiversity hotspots of India and Assam (2 Assignment) 3. Mapping of National park, biosphere reserve and wildlife sanctuary of Assam / N.E. India / India. (3 Assignments) 4. Mapping of phytogeographic and zoogeographic regions of the world. (2 Assignments)	-	-	9	18
Total				9	18
Grand Total				30	60

Title of the Course	Health Geography (Optional)
Course Code	GGY-2-DSE-5044
Total Credit (theory)	4 (3-1-0)
Contact hours	60
Distribution of Marks	80+20 (End Semester + In Semester)
Course outcomes	1. Understand the scope, significance, and approaches of health geography 2. Analyze the impact of environmental influences on health using case studies 3. Understand the classification of diseases, their modes of transmission, and distribution 4. Evaluate health policies, and their spatial implications, and address future challenges 5. Interpret patterns of disease spread using geographic methods and GIS applications in disease surveillance.

Unit	Content	Lecture (L)	Tutorial (T)	Practical (P)	Total Hours
Unit 1:	Introduction to Health Geography: Overview: Definitions, scope, and importance of health geography. Key Concepts: Health, wellness, illness, disease; geographic distribution. Approaches of study: ecological, social and spatial. Historical Development: Evolution of health geography as a discipline. Dualism between medical geography and geography of health.	9	1	-	10
Unit 2:	Environmental Health : Concepts of health, diseases & well being Environmental Influences: Impact of physical and built	9	2	-	11

	environments on health, environmental pollution & health hazards. Case Studies: Analysis of environmental health issues like air quality and water sanitation. Tools and Techniques: Introduction to methodologies for assessing environmental health risks.				
Unit 3:	Diseases and its Transmission: Classification of diseases: genetic, zoonotic, communicable, non-communicable, occupational, deficiency diseases and malnutrition. Endemic epidemic & pandemic patterns. Modes of transmission of major diseases (Malaria, Japanese encephalitis, tuberculosis, hepatitis, AIDS and COVID-19) and their broad global distribution.	9	2	-	11
Unit 4:	Disease Ecology and its mapping: Disease Distribution: Patterns and processes influencing disease spread. Factors influencing disease transmission (pathological, physical, environmental, social, cultural and economic) Epidemiological Applications: Using geographic methods to track and control outbreaks. Advanced GIS Applications: Utilizing GIS in disease surveillance and epidemiological research.	9	2	-	11
Unit 5:	Health Care system & Accessibility: Health Systems: Meaning and components; Universal government-funded health system; Role of WHO and UNICEF in global health care; SDG3 for good health and Well-	9	2	-	11

	being. Policy Analysis: Spatial analysis of health policies and their implications. family welfare, immunization, National Health Mission and its programmes, urban-rural contrast in health infrastructure. Future Challenges: Discussion on emerging health issues like during COVID-19 and the role of health geography in addressing them.				
Unit 6:	Climate change & Human Health: Impact of climate change on health and diseases, nutrition & food security	5	1		6
Total		50	10	-	60

Reading List:

1. AkhtarRais (Ed.), 1990 : Environment and Health Themes in Medical Geography, AshishPublishing House, New Delhi.
2. Anthamatten P, (2011), Introduction to the Geography of Health, Rawat Publications, Jaipur
3. Avon Joan L. and Jonathan A Patzed.2001 : Ecosystem Changes and Public Health,Baltimin, John Hopling Unit Press(ed).
4. Banerji, D. (1986) :Social Sciences and Health Services in India, LokPrakashan,New Delhi.
5. Bradley,D.,1977: Water, Wastes and Health in Hot Climates, John Wiley Chichesten.
6. Brown, T., McLafferty, S., Moon, G. (2010): A Companion to Health and Medical Geography, Wiley Blackwell, UK
7. Christaler George and HristopolesDionissios, 1998: Spatio Temporal Environment HealthModelling , Boston Kluwer Academic Press.
8. Cliff, A.D. and Peter,H., 1988 : Atlas of Disease Distributions, Blackwell Publishers, Oxford.
9. Curtis, S.(2004):Health and Inequality: Geographical Perspectives, Sage Publications,London

10. Gatrell, A., and Loytonen, 1998 : GIS and Health, Taylor and Francis Ltd, London.
11. Hardham T. and Tannav M., (eds): Urban Health in Developing Countries; Progress, Projects, Earthgoan, London.
12. Mishra, R.P. (1970): Medical Geography of India, National Book Trust of India.
13. Mishra, R.P. (2002), Geography of health : a treatise on geography of life and death in India, Concept Publishing Co., New Delhi
14. Murray C. and A. Lopez, 1996 : The Global Burden of Disease, Harvard University Press.
15. Moeller Dade wed., 1993: Environmental Health, Cambridge, Harvard Univ. Press.
16. National Health Mission <https://nhm.gov.in/>
17. National Health Portal India <https://www.nhp.gov.in/healthprogramme/nationalhealthprogrammes>
18. Phillips, D. and Verhasselt, Y., 1994: Health and Development, Routledge, London.
19. Shaw, M., Dorling, D. and Mitchell, R, (2002) Health, Place and Society, Pearson, London
20. Tromp, S., 1980: Biometeorology: The Impact of Weather and Climate on Humans and their Environment, Heydon and Son.

Title of the Course	Micro Area Studies and Regional Analysis (Optional)
Course Code	GGY-2-DSE-5044
Total Credit (theory)	4 (3-1-0)
Contact hours	60
Distribution of Marks	80+20 (End Semester + In Semester)
Course outcomes	1. Understand and distinguish the nuanced concepts, different theories and methodologies utilized in Micro Area Studies. 2. Comprehend and execute diverse research methods and techniques in area studies, ensuring ethical conduct. 3. Apply learned concepts and methods to perform detailed analyses of chosen micro areas, highlighting problems and potential solutions. 4. Understand the interdependence between regional dynamics and global issues, incorporating case studies for comprehensibility. 5. Demonstrate independent research skills by conducting a detailed study on a selected micro area, analyzing data, presenting findings, and refining analytical skills.

Unit	Content	Lecture (L)	Tutorial (T)	Practical (P)	Total Hours
Unit 1:	Introduction to Micro Area Studies : Definition, nature and scope of micro area studies Importance of studying micro areas, difference between micro area study and macro area study Historical Development: Conceptual and methodological development of the micro area studies in India and abroad	10	2	-	12

	Key concepts: Basic theories and methods adopted in micro area studies. Micro landscapes: Physical and cultural components, human response to micro landscapes Impact of social and physical processes on micro landscapes.				
Unit 2:	Research Methodologies in Area Studies : Participatory Appraisal methods and techniques Interdisciplinary approaches in micro area studies Qualitative and quantitative research methods Selection of micro areas for case study, and primary field survey methodology Data collection techniques specific to regional analysis Ethics and considerations in conducting micro area/ regional studies.	10	2	-	12
Unit 3:	Micro Area Studies - Focused Analyses : Deep dive into problems and potential of specific regions (e.g., a village, municipality area/ ward, urban fringe, micro ecological setting, habitat etc). Physical, Ecological, Cultural and Political character analysis of chosen micro areas. Comparative studies on different micro areas, micro area planning and development.	10	2	-	12
Unit 4:	Regional Dynamics and Global Impact: How regional characteristics influence national and international issues. Case studies on regional conflict, economic development, and cultural exchange. Role of geographical boundaries and political entities	10	2	-	12

	in shaping regional dynamics. Regional development plans and policies				
Unit 5: Independent Project work	Students select a micro area for detailed study (local area) Application of research methodologies to gather and analyze data. Presentation of findings in written formats. Peer review and critique sessions to refine analytical skills.	10	2	-	12
Total		50	10	-	60

Reading List

1. Hall, Robert, B. (1947): Area Studies with Special Reference to their Implications for Research in Social Sciences, Social Science Research Council, New York.
2. David Ludden (1998): Area studies in the age of globalization, University of Pennsylvania.
3. Mukherjee, N. (1993). Participatory rural appraisal: methodology and applications. Concept Publishing Company.
4. Cahnman, Warner J. (1948): Outline of a Theory of Area Research” Annals of the Association of American Geographers, vol.38.No 4, pp.233-243.
5. Labh, Kapileswar (1986): Area Studies in India: Retrospect and Prospect, Unpublished Seminar Paper, Centre for Himalayan Studies, North Bengal University.
6. Mukherjee, N. (1995). Participatory rural appraisal and questionnaire survey (comparative field experience and methodological innovations).
7. Ullman Edward L. (1953): Human Geography and Area Research, Annals of the Association of Area Research Vol.43, No I.
8. Chambers, R. (1981). Rapid rural appraisal: rationale and repertoire. Public administration and development, 1(2), 95-106.
9. Chambers, R. (1981). Rapid rural appraisal: rationale and repertoire. Public administration and development, 1(2), 95-106.
10. McCracken, J. A., Pretty, J. N., & Conway, G. R. (1988). An introduction to rapid rural appraisal for agricultural development. An introduction to rapid rural appraisal for agricultural development.
11. Krosnick, J. A. (2018). Questionnaire design. The Palgrave handbook of survey research, 439-455.
12. Lietz, P. (2010). Research into questionnaire design: A summary of the literature. International journal of market research, 52(2), 249-272.
13. Codó, E. (2008). Interviews and questionnaires. The Blackwell guide to research methods in bilingualism and multilingualism, 158-176.
14. Hennink, M. M. (2013). Focus group discussions. Oxford University Press.

15. Lawrence Neuman, W. (2014). Social research methods: Qualitative and quantitative approaches.
16. Acharya Amitav (2006): International Relations and Area Studies: Towards a New Synthesis, Institute of Defence and Strategic Studies, Nanyong Technological University, Singapore.
17. Appadurai Arjun (1996): Modernity at Large:56Cultural Dimensions of Globalisation , Minneapolis, University of Minnesota Press.
18. Bates, Robert H (1997): Area Studies and the Discipline: A Useful Controversy, Political Science and Politics 30 (2).
19. Droselle,-Jean B. (1952): Area Studies: problems of method, International Social Science Bulletin, Vol. IV, No.IV.
20. Grieb, Kenneth J (1974): Area Studies and the Traditional Disciplines,The History Teacher, Vol. 7, No.2.
21. Morgenthau, Hans (1952): Area Studies and the Study of International Relations, International Social Science Bulletin, Vol. IV, No.IV.
22. Murdoch, George P. (1950): The conceptual basis of Area Research, World Politics, Vol. 2, No IV.
23. Julian H. (1950): Area Research Theory and Practice, Social Science Research Council, New York.
24. Whitaker, Urban (1959): An Application of Area Studies to the Teaching of General Education Courses in International Relations, Vol.5, No.4.

Title of the Course	Advanced Statistics in Geography
Course Code	GGY-2-FSC-5054
Total Credit (theory)	4 (3-1-0)
Contact hours	60
Distribution of Marks	80+20 (End Semester + In Semester)
Course outcomes	1. Understand spatial data analysis skills 2. Improve understanding of spatial pattern and processes. 3. Strengthen Research methodology and competence 4. Develop skill in statistical software

Unit	Content	Lecture (L)	Tutorial (T)	Practical (P)	Total Hours
Unit I	Sampling: Definition, Types and sampling distribution Hypothesis testing: Formation of Hypothesis, testing of Hypothesis: Z-Test, F-Test, Chi-Sq Test, Level of significance, Confidence limit, Parametric and non-parametric tests Probability and its application in Geography. Probability distribution: Normal, Binomial, Poisson.	12	3	-	15
Unit II	Concept of simple and multiple correlation, simple and multiple regression analysis and its application in Geography. Time series analysis; Fitting Exponential Graph, Power curve, Logistic curve and their application in Geography	12	3	-	15
Unit III	Matrices: Addition, Subtraction, Multiplication. Inverse	12	3	-	15

	of Matrix, adjoint of Matrix, Determinants, estimation of two variables (x, y) and three variables (x,y,z). Multivariate analysis				
Unit IV	Conceptual basis of quantitative techniques in spatial distribution, pattern Principal components analysis/factor analysis	12	3	-	15
Total		48	12	-	60

Reading List

1. Hammond P. and McCullagh P. S., 1978: Quantitative Techniques in Geography: An Intro- duction, Oxford University Press.
2. Sarkar, A. (2013) Quantitative Geography. techniques and presentations. Orient Black SwanPrivate Ltd., New Delhi.
3. Yeates M., 1974: An Introduction to Quantitative Analysis in Human Geography, McGrawHill, New York. 26
4. Mathews, J.A., 1987: Quantitative and Statistical Approaches to Geography: A PracticalManual Pergamon,Oxford.
5. Mahmood, A., 1999: Statistical Methods in Geographical Studies, Rajesh Publications,New Delhi.
6. Elhance, D.N., 1972: Fundamentals of statistics, KitabMaha1,A11ahabad
7. Monkhouse, F.J. Wilkinson, H.R., 1989: Maps Diagrams, B.I. Publications, New Delhi
8. Gregory, S., 1963: Statistical Methods and Geographers, Longman, London.

3rd Semester

Group A:

Title of the Course	Remote Sensing, GIS & GPS
Course Code	GGY-3-DSC-5064 (A)
Total Credit (Theory)	4 (3-1-0)
Contact hours	60
Distribution of Marks	80+20 (End Semester + In Semester)
Course outcomes	At the end of the course students should be able to: 1. Understand the rationale behind use of remotely sensed data its advantages and disadvantages. 2. Understand how GIS/GPS methodologies can be used to address spatial analysis from the theoretical perspective.

Unit	Content	Lecture	Tutorial	Practical	Total hours
Group I: Remote Sensing (30 marks)	1. Basic Concepts and Principles of Remote Sensing. 2. Electro Magnetic Radiation; Wavelength regions of electro-magnetic radiation, resolutions 3. Remote Sensing Systems: Platform, types of platforms & its characteristics. 4. Remote Sensing Data Sources Interpretation: Visual and digital techniques; digital image processing. 5. Application of Remote Sensing in geomorphology, land use/ land cover, forestry, rural and urban	20	4	-	24

	landscape study.				
Group II: GIS (30 marks)	1. Field of GIS: Principles, components and functions. 2. Data type and structure of GIS; Raster and Vector data structure. 3. Spatial analysis techniques and Thematic representation of data in GIS. 4. GIS Softwares: Licensed and Open Source. 6. Application areas of GIS in geographical study.	20	4	-	24
Group III: GPS (20 marks)	1. Introduction to GPS technology and its working principles. 2. GPS elements and types of signals and receivers and data acquisition techniques; Accuracy of GPS data; Concept and principle of DGPS. 3. Application areas of GPS in geographical study.	10	2	-	12
Total		50	10		60

Books Recommended for Course

1. Burrough, P.A.,1986: Principles of Geographical Information Systems in Land Resources Assessment,Clarendon Press, Oxford.
2. Burrough, P.A. and Mc Donnel, R.A.,1998: Principles of Geographical Information Systems,Oxford University Press.
3. Colwell, R.N., 1983: Manual of Remote Sensing, Vol. I & II, American Society ofPhotogrammetry.
4. Curran, Paul, J., 1985: Principles of Remote Sensing, Longman Group Ltd. Gautam, N.C.,1970: Urban Landuse Study through Aerial Photo-interpretationTechniques, PinkPublishing House, Mathura.
5. Star, J. and Ester, J., 1990: Geographic Information System, Prentice-Hall. Liles and, T.M. andKiefer, R.W., 1987: Remote Sensing and ImageInterpretation, John Wiley.
6. Hord, R. Michael., 1986: Remote Sensing: Methods and Applications, John Wiley. Maguire, D. J.,Goodchild, M. and Rhind, D. J.,1990: GeographicalInformation Systems:Principles and Applications, Longman Science and Technology Publications. Robinson,A. H., et al., 1995: Elements of Cartography, John Wiley.
7. Sabins, Floyd F., 1987: Remote Sensing Principles and Interpretation, W.H. Freeman and Company,New York.

Title of the Course	Applications of Remote Sensing, GIS and GPS
Course Code	GGY-3-DSC-5074 (A)
Total Credit (Theory)	4 (3-1-0)
Contact hours	60
Distribution of Marks	80+20 (End Semester + In Semester)
Course outcomes	• To develop conceptual and technical understanding of Remote Sensing, GIS, and GPS. • To enable students to apply geospatial technologies in real-world problem solving. • To provide hands-on training in spatial data handling, analysis, and interpretation.

Units	Topics	Lecture	Tutorial	Practical	Total hours
UNIT I: Applications of RS and GIS in Physical Geography	• Land use and land cover (LULC) mapping • Geomorphological studies: landform analysis, drainage mapping • Hydrological applications: watershed management, flood mapping • Climatology: weather monitoring and climate change studies • Soil mapping and vegetation analysis	10	2	-	12
UNIT II: Applications of RS and GIS in Human Geography	• Urban and regional planning: urban sprawl analysis • Population distribution and settlement mapping • Transportation and infrastructure planning • Agricultural applications: crop assessment,	10	2	-	12

	- drought monitoring - Disaster management: cyclone, earthquake, and forest fire assessment				
UNIT III: Applications of RS and GIS in Geographical Studies	Physical Geography Applications - Disaster management (flood, earthquake, landslide, bank erosion, siltation) - Climate and environmental monitoring Human Geography Applications - Transportation and accessibility analysis - Resource management and regional planning	10	2	-	12
UNIT IV: Applications of GPS in Geographical Studies	- Environmental Geography: - Household mapping, Biodiversity mapping, forest monitoring, environmental impact assessment - Agricultural Geography: - Precision farming, soil sampling, Agricultural mapping, Crop mapping	10	2	-	12
UNIT V: Resource Management	- Land resource management: soil conservation and land-use planning - Water resource management: rainwater harvesting - Forest resource management: afforestation, social forestry, JFM - Mineral and energy resource management - Biodiversity conservation and wildlife management - Cloud computing: platform (for example Google	10	2	-	12

	Earth Engine), data and tools				
Total		50	10		60

Reading list:

1. Burrough, P.A.,1986: Principles of Geographical Information Systems in Land Resources Assessment,Clarendon Press, Oxford.
2. Burrough, P.A. and Mc Donnel, R.A.,1998: Principles of Geographical Information Systems,Oxford University Press.
3. Colwell, R.N., 1983: Manual of Remote Sensing, Vol. I & II, American Society ofPhotogrammetry.
4. Curran, Paul, J., 1985: Principles of Remote Sensing, Longman Group Ltd. Gautam, N.C.,1970: Urban Landuse Study through Aerial Photo-interpretationTechniques, PinkPublishing House, Mathura.
5. Star, J. and Ester, J., 1990: Geographic Information System, Prentice-Hall. Liles and, T.M. andKiefer, R.W., 1987: Remote Sensing and ImageInterpretation, John Wiley.
6. Hord, R. Michael., 1986: Remote Sensing: Methods and Applications, John Wiley. Maguire, D. J.,Goodchild, M. and Rhind, D. J.,1990: GeographicalInformation Systems:Principles and Applications, Longman Science and Technology Publications. Robinson,A. H., et al., 1995: Elements of Cartography, John Wiley.
7. Sabins, Floyd F., 1987: Remote Sensing Principles and Interpretation, W.H. Freeman and Company,New York.

Title of the Course	Fundamental of Spatial Information Technology
Course Code	GGY-3-DSC-5084 (A)
Total Credit (Theory)	4 (3-1-0)
Contact hours	60
Distribution of Marks	80+20 (End Semester + In Semester)
Course outcomes	1. Upon completion of this course, students will be able to understand the fundamental concepts, components, and recent trends in Spatial Information Technology (SIT), along with its core tools such as GIS, Remote Sensing, and GPS. 2. They will develop practical skills in map interpretation, spatial data handling, database management, and the application of raster and vector-based analytical techniques. 3. Furthermore, students will be able to apply spatial analysis and modelling approaches for real-world problem solving in geographical and environmental contexts.

Units	Topics	Lecture	Tutorial	Practical	Total hours
Unit 1: Introduction to SIT and basics of Maps and Cartography	1.1 Meaning and recent trend in SIT 1.2 Components of SIT 1.3 Types of spatial and Non Spatial data 1.4 Scale, Projection and Coordinates 1.5 Types of Maps 1.6 Digital and Traditional cartography 1.7 Map Interpretation.	11	2	-	13
Unit 2: Geographic Information System	3.1 Definition and Components 3.2 Data input, Storage and Output 3.3 Raster and Vector data Model 3.4 GIS analysis (Overlay and Buffering)	11	2	-	13

Unit 3: Remote Sensing and Global Positioning System	4.1 Principle of Remote Sensing 4.2 Types of Satellites and sensors. 4.3 Aerial Photography v/s Satellite Imagery 4.4 Image Interpretation Techniques. 4.5 Concept and working of GPS 4.6 Segments of GPS	11	2	-	13
Unit 4: Spatial Data and Database management	6.1 Types of Spatial Data (Point, Line and Polygon) 6.2 Attribute Data 6.3 Data Source (Primary and Secondary) 6.4 DBMS	11	2	-	13
Unit 5: Spatial analysis and Modeling	7.1 Spatial analysis and Modeling and Application of SIT	6	2	-	8
Total		50	10		60

Reading list:

Bolstad, Paul. 2012. GIS Fundamentals: A First Text on Geographic Information Systems, Xan Edu. Publishing Inc. Ann Arbor.

Dessers, E.2014. Spatial Data Infrastructures at Work: Analysing the Spatial Enablement of Public Sector Processes. Leuven University Press, Belgium.

DeMers, Michael. N.2008. Fundamentals of Geographic Information Systems. Wiley.

Fazal, S.2008. GIS Basics. New Age International Pvt. Ltd Publishers.

Jensen, John R. 2015. Introductory Digital Image Processing: A Remote Sensing Perspective, Pearson Education.

Lillesand, T.M. and Kiefer, R.W., 1987. Remote Sensing and Image Interpretation, John Wiley.

Lo, C. P. and Yeung, A.K.W.2006. Concepts and Techniques of Geographic Information Systems. Prentice Hall.

Misra, Pratap and Enge, Per.2010. Global Positioning System: Signals, Measurements, and Performance. Ganga-Jamuna Press, Lincoln,MA.

Nedovic-Budic, Z., Crompvoets, J. and Georgiadou, Y. 2011. Spatial Data Infrastructures in Context: North and South. CRC Press: Taylor & Francis.

Steinberg, Sheila L & Steinberg, 2015. Steven J. GIS Research Methods: Incorporating Spatial Perspectives, ESRI Press: Redlands

Title of the course	Practicals on Remote Sensing, GIS & GPS
Course code	GGY-3-DSC-5094 (A)
Total Credit (Practical)	4 (0-0-4)
Contact hours	60
Distribution of Marks	80+20 (End Semester + In Semester)
Course outcomes	1. Understand and apply the fundamental principles of photogrammetry, including determination of photo scale, object height, slope, and relief displacement, along with interpretation of aerial photographs and satellite imagery. 2. Demonstrate skills in interpretation and preparation of thematic maps such as land use/land cover, settlement patterns, road networks, and fluvial geomorphology using remote sensing data. 3. Develop competency in GIS data creation, including digitization of spatial features (point, line, polygon), thematic representation, and integration of GPS-based field data. 4. Apply georeferencing techniques and manage spatial and attribute data using GIS tools, including relational data models, data integration, and cartographic visualization. 5. Perform spatial analysis and generate decision-support outputs through thematic mapping using demographic, climatic, and socio-economic datasets. 6. Execute digital image processing techniques such as image enhancement and classification (supervised and unsupervised) for analyzing remote sensing data. 7. Integrate remote sensing, GIS, and GPS data for advanced applications including Land Use/Land Cover (LULC) mapping and spatial database development. 8. Utilize geospatial models and applications such as land governance tools and erosion models (e.g., USLE and RUSLE) for practical problem-solving. 9. Demonstrate practical proficiency through systematic documentation (practical notebook) and articulate understanding through viva-voce examination.

Unit	Content	Lecture	Tutorial	Practical	Total hours
Unit1: Photogrammetry and Image Interpretation	1. Fundamentals of Photogrammetry: determination of photo scale, object height, slope between two points and relief displacement (4 exercises) 2. Interpretation of aerial photographs and preparation of land use map, settlement map and road map (4 exercises) 3. Interpretation of satellite imagery and preparation of land use/ land cover and fluvial geomorphic maps (4 exercises)	-	-	6	12
Unit 2: GIS Data Creation and Field Techniques	1. Digitization of different layers of spatial information (Point, line and polygon) and their thematic representation (5 exercises) 2. Study of changing land use and river course using remote sensing and GIS techniques (4 exercises) 3. GPS data collection (Point, Line and Polygon) and plotting (4 exercises)	-	-	6	12
Unit3: Georeferencing and Data Management	1. Design of work-plan /schematic chart / flow-chart (geoinformatics components and functions, georeferencing procedure, Georeferencing a part or whole topographical map and satellite Imagery Creation of a relational data model. Spatial data types – comparison of different satellite imageries (6 exercises) 2. Digitization of maps using standard GIS package – point, line and polygon features from small- and large-scale maps Revenue Circle / Block / District level map of the state /region or from topographical sheets on 1:250,000 or 1:50,000 or 1:63,360 scales). (4 exercises) 3. Adding attributes by joining and relating data, display of attribute data through cartographic methods (2 exercises)	-	-	6	12
Unit 4: Spatial Analysis and Thematic Mapping	1. Decision support mapping for point and line features (4 exercises) 2. Extraction of polyline and polygon features of specific themes from a georeferenced imagery (2 exercises) 3. Preparation of thematic maps from various attributes (demographic, climatic, socioeconomic) of point, line and polygon features (2 exercises) 4. Preparation of thematic maps from nominal data – such as soils, geology, vegetation types / administrative units (2 exercises)	-	-	6	12

Unit 5: Image Processing and Advanced Applications	1. Digital Image Processing – Enhancement principles and techniques (6 exercises) 2. Image Classification techniques – Unsupervised and Supervised 3. Integration of remote sensing data in GIS environment – Land Use/Land Cover (LULC) 4. Integration of GPS data in GIS environment for point features, line features and Polygon features (8 exercises) 5. Land Governance and GIS (2 Exercises) 6. Usage of established models such as USLE and RUSLE (2 exercises) 7. Slope, Aspect, TIN from DEM, DTM	-	-	6	12
Unit 6: Practical notebook & viva-voce (15 marks)	Practical note book (10 marks) Viva-voce (5 marks)				
Total		-	-	30	60

Title of the course	Fundamental of Research Ethics and Scientific research writing
Course code	GGY-3-DSE-5104
Total Credit (Practical)	4 (3-1-0)
Contact hours	60
Distribution of Marks	80+20 (End Semester + In Semester)
Course outcomes	1. Students will be able to understand the meaning, concepts, principles, and importance of research ethics, ethical publication practices, authorship, plagiarism, and intellectual property rights in geographical research. 2. Students will acquire knowledge of different types of geographical data, methods and tools of data collection, interdisciplinary approaches, and the various stages of scientific research writing and publication. 3. Students will develop the ability to evaluate research publications, citation databases, indexing systems, and research impact indicators such as H-index, CiteScore, Impact Factor, Scimago, and identify predatory journals and plagiarism issues.

Unit	Content	Lecture	Tutorial	Practical	Total hours
Unit 1:	Meaning, concept and principles of ethical research Vs unethical research, research ethics with special reference to geography; Idea of ethical publications, authorship and plagiarism	10	2		12

Unit 2:	Data types and its collection in geographical research; Methods and tools of geographical data collection; inter disciplinary character of geography research	10	2		12
Unit 3:	Various steps of scientific research writing: literature review, statement of the problem, formulation of objective, hypothesis, methodological layout of the research, research question, explanation and analysis part of research, referencing, bibliographic	10	2		12
Unit 4:	Publication ethics in relation to the research, various types of research publication, principles of open access journal and other types: peer reviewed journal, Scopus index, Web of science, predatory publication, checking of pl plagiarism	10	2		12
Unit 5:	Intellectual property right, citation database, meaning of citation, use of citation, cite score, google scholar, H-Index, impact factor, scimago etc.	10	2		12
Total		50	10		60

Reading list:

Bird, A. (2006). Philosophy of Science. Routledge

MacIntyre, Alasdair (1967) A Short History of Ethics. London

Indian National Science Academy (INSA). Ethics in Science Education, Research and Governance (2019), ISBN:978-81-939482-1-7

P. Chaddah, (2018) Ethics in Competitive Research: Do not get scooped; do not get plagiarized, ISBN: 978-9387480865

Bcall, J. (2012). Predatory publishers are corrupting open access, Nature, 489(7415), 179-179.

Resnik, D.B. (2011). What is ethics in research & why is it important. National Institute of Environmental Health Sciences, 1-10.

Group B:

Title of the Course	Population Geography: Theories and Global issues
Course Code	GGY-3-DSC-5064 (B)
Total Credit (Theory)	4 (3-1-0)
Contact hours	60
Distribution of Marks	80+20 (End Semester + In Semester)
Course outcomes	1. Analyse the nature, scope, development, and approaches of population geography, and explain its relationship with demography, population data sources, demographic transition, population projection, and population policies. 2. Evaluate major population theories and population dynamics by interpreting fertility, mortality, migration, nuptiality, population composition, and the relationship between population, resources, food, and energy. 3. Compare and interpret the demographic characteristics of developed and less-developed countries with reference to vital rates, infant mortality, age-sex structure, literacy, life expectancy, rural-urban composition, and occupational structure for understanding socio-economic development patterns.

Unit	Content	Lecture	Tutorial	Practical	Total hours
Unit 1:	The field of population geography: nature, development & approaches; its relationship with demography, sources of population data, demographic transition, population projection, policies & planning	10	2	-	12
Unit 2:	Population theories: Ideas of Malthus, Ricardo & Marx	7	2	-	9
Unit 3:	Population composition: age, sex, literacy, rural-urban, population composition theories, models & theories, vital rates, migration: its causes, consequences and its impacts	8	1	-	9
Unit 4:	Population & resource relationship: relationship between	10	2	-	12

	population, food & energy				
Unit 5:	Population growth and distribution: fertility, mortality, nuptiality: measurement, population growth & socio-economic development	8	2	-	10
Unit 6:	Comparative study of population characteristics of the developed & less-developed countries: vital rates, infant mortality rate, age & sex composition, life expectancy, literacy & education, rural & urban composition & occupational composition	7	1	-	8
Total		50	10		60

Reading list:

- Ahmad, A., et. al (eds), 1997: Demographic Transition: The Third Third-World Scenario, Rawat Publications, Jaipur and New Delhi.
- Chandna, R.C., 1986: A Geography of Population, Kaylani Publishers, New Delhi.
- Clarke, J.I., 1972: Population Geography, Pergamon Press, Oxford.
- Haggett, P., 1972: Geography: A Modern Synthesis, Harper & Row, New York.
- Peters, G.L. and Larkin, R.P., 1979: Population Geography: Problems, Concepts and Prospects, Kendall/ Hunt Iowa.
- Robinson, H., 1981: Population and Resources, Macmillan Press, London.
- Sandram, K.V. and Nangia, S., (eds): Population Geography, Heritage Publishers, New Delhi.
- Trewartha, G.T., 1969: A Geography of Population: World Pattern, John Wiley & Sons, Inc., New York.
- Woods, R., 1979: Population Analysis in Geography, Longman, London.
- Zelinsky, W., 1966: A Prologue to Population Geography, Prentice-Hall, Englewood Cliffs.
- Asha Bhende and Tara Kanitkar- Principles of Population Studies., Himalaya Publications.
- Bogue, Donald J.- Principles of Demography, John Wiley and Sons, New York.
- Kulkarni, Sumati- Inter-relationship between Population and Socio Economic Development: Present Condition and Future Scenario in K. Srinivasan, Population Policy and Reproductive Health, Hindustan Publishing Corpn., New Delhi.
- Moonis, Raza- Development and Society, Vikas Publishing House, New Delhi.

Title of the Course	Population geography: India & North-East
Course Code	GGY-3-DSC-5074 (B)
Total Credit (Theory)	4 (3-1-0)
Contact hours	60
Distribution of Marks	80+20 (End Semester + In Semester)
Course outcomes	1. Develop a comprehensive understanding of the spatial distribution, density, growth, and composition of population in India and the North-East region, along with the factors influencing regional demographic disparities. 2. Analyze population dynamics such as fertility, mortality, migration, urbanization, and demographic transition in the Indian context, and evaluate their socio-economic and environmental implications. 3. Examine the relationship between population and development with reference to sustainable development, HDI, family planning, and population-related issues such as poverty, unemployment, and regional inequality.

Unit	Content	Lecture	Tutorial	Practical	Total hours
Unit 1:	Population distribution of India & North-East, factors affecting population distribution, population density, population growth trend (1901-2011),	10	2	-	12
Unit 2:	Regional disparity in population, distribution and density, , population composition: age, sex, literacy, education and occupation	10	2	-	12
Unit 3:	Population dynamics: study on fertility, mortality and mobility; demographic transition model in Indian context, migration pattern and its causes and consequences and urbanization	10	2	-	12
Unit 4	Population and development: Population and research relations, sustainable development goals, population and	10	2	-	12

	environment, HDI				
Unit 5:	Population policies and practices: family planning, population related problems: poverty, unemployment, regional inequality.	10	2	-	12
Total		50	10	-	60

Reading List

1. Barrett H. R., 1995: Population Geography, Oliver and Boyd.
2. Bhende A. and Kanitkar T., 2000: Principles of Population Studies, Himalaya Publishing House.
3. Chandna R. C. and Sidhu M. S., 1980: An Introduction to Population Geography, Kalyani Publishers.
4. Chandna R. C., 2014, Geography of Population: Concepts, Determinants and Patterns, Kalyani Publishers.
5. Clarke J. I., 1965: Population Geography, Pergamon Press, Oxford.
6. Jones, H. R., 2000: Population Geography, 3rd ed. Paul Chapman, London. 21
7. Lutz W., Warren C. S. and Scherbov S., 2004: The End of the World Population Growth in the 21st Century, Earthscan.
8. Newbold, K. B., 2009: Population Geography: Tools and Issues, Rowman and Littlefield Publishers.
9. Pacione, M., 1986: Population Geography: Progress and Prospect, Taylor and Francis.
10. Wilson, M. G. A., 1968: Population Geography, Nelson.
11. Panda, B. P. (1988): Janasankya Bhugol, M P Hindi Granth Academy, Bhopal.
12. Maurya, S. D. (2009) Jansankya Bhugol, Sharda Pustak Bhawan, Allahabad.
13. Chandna, R. C. (2006), Jansankhya Bhugol, Kalyani Publishers, Delhi.
14. Roy, D. (2015), Population Geography, Books and Allied (P) Ltd., Kolkata.
15. Ahmad, A., Noin, D. and Sharma, H.N. (eds), 1997, Demographic Transition: The Third World Scenario, Rawat Publications, Jaipur and New Delhi, 1997.
17. Peters, G.L. and Larkin, R.P., 1979: Population Geography: Problems, Concepts and- Prospects, Kendall/ Hunt Iowa.

Title of the course	Population and Migration
Course code	GGY-3-DSC-5084 (B)
Total Credit (theory)	4 (3-1-0)
Contact hours	60
Distribution of Marks	80+20 (End semester + In Semester)
Course outcomes	1. Students will be able to explain the concept, causes, typologies, patterns, and consequences of migration, including rural–urban migration, internal and international migration, with special reference to India and North-East India. 2. Students will develop an understanding of major migration theories and models such as Ravenstein’s Laws of Migration, Lee’s Theory, Reilly’s Law, Zipf’s Theory, Stouffer’s Intervening Opportunities Theory, Hägerstrand’s Diffusion Model, and Wolpert’s Behavioral Model, and apply them in geographical analysis. 3. Students will critically analyze the relationship between migration, population growth, and resource distribution, and evaluate contemporary population and migration-related problems along with mitigation and migration policies in developed and developing countries, particularly India.

Unit	Content	Lecture	Tutorial	Practical	Total hours
Unit1:	1. Migration: factors(Pull and Push factors) 2. Typologies (Internal and International) 3. Migration cause and consequences of migration (a case study of India) 4. Patterns and flow of migration, Rural Urban Migration	10	2	-	12

Unit 2:	1. Model and Theories: laws of migration- Ravenstein and Lee theories of migration: Reilly, Zipf, Stouffer, Hagerstrand and Wolpert.	10	2	-	12
Unit3:	1. Migration and Population Growth, Population and Resource interface.	10	2	-	12
Unit 4:	1. Contemporary population problems in the developing and developed countries, problems related to migration with special reference to India and North-East	10	2	-	12
Unit 5:	Mitigation Policies: Policies adopted by different countries of developed and developing world, migration policies of India	10	2	-	12
Total		50	10	-	60

Reading list:

1. Ashish Bose- Indian's Urbanization (1901-2001), Tata McGraw Hill Publishing Co. Ltd., New Delhi.
2. Mitra, R.G.- Understanding Patterns of Migration from Census 2001 Data, Population Stabilization and Development, Council of Cultural Growth and Cultural Relations, Cuttack (2002).

Title of the course	Practical on Population Geography
Course code	GGY-3-DSC-5094 (B)
Total Credit (theory)	4 (0-0-4)
Contact hours	60
Distribution of Marks	80+20 (End semester + In semester)
Course outcomes	1. Develop cartographic and analytical skills to map and interpret population distribution, density, concentration, rural–urban composition, population potential surface, and demographic characteristics at global and national scales. 2. Apply demographic and socio-economic techniques to analyze population growth, fertility, mortality, migration, immigration–emigration patterns, population resource regions, and levels of socio-economic well-being with special reference to India and the world. 3. Conduct population-based field surveys and interpret spatial data using quantitative and qualitative methods for understanding demographic processes, regional disparities, and population–resource relationships.

Units	Content (To attempt five questions carrying 13 marks each)	Lecture	Tutorial	Practical	Total hours
Unit 1	1. Mapping of population distribution, density, Concentration in world and India (8 exercise) 2. Exponential growth of Population and Proportional population in the world and India. (8 exercise) 3. Mapping of Rural Urban population and population potential surface in India. (8 exercise)	-	-	15	30

Unit 2	1. Representation of Demographic (Fertility; Mortality), Social and Economic Characteristics. (8 exercise) 2. Population Resource Regions in the world. (2 exercise) 3. Levels of Socio-economic well beings and demographic zones in India. (3 exercise) 4. Representation of Immigration and Emigration pattern of developed and developing countries with special reference to India (6 exercise: Immigration 3: Developed, developing and India & Emigration: 3 Developed, developing and India)	-	-	10	20
Unit 3	Application of Field Survey method in Population studies. (3 exercise)	-	-	05	10
Unit 4	Practical Notebook and Assessment. (10 Marks) Viva-Voce (5 Marks).				
Total				30	60

Title of the course	Fundamental of Research Ethics and Scientific research writing
Course code	GGY-3-DSE-5104
Total Credit (Practical)	4 (3-1-0)
Contact hours	60
Distribution of Marks	80+20 (End Semester + In Semester)
Course outcomes	1. Students will be able to understand the meaning, concepts, principles, and importance of research ethics, ethical publication practices, authorship, plagiarism, and intellectual property rights in geographical research. 2. Students will acquire knowledge of different types of geographical data, methods and tools of data collection, interdisciplinary approaches, and the various stages of scientific research writing and publication. 3. Students will develop the ability to evaluate research publications, citation databases, indexing systems, and research impact indicators such as H-index, CiteScore, Impact Factor, Scimago, and identify predatory journals and plagiarism issues.

Unit	Content	Lecture	Tutorial	Practical	Total hours
Unit 1:	Meaning, concept and principles of ethical research Vs unethical research, research ethics with special reference to geography; Idea of ethical publications, authorship and plagiarism	10	2	-	12
Unit 2:	Data types and its collection in geographical research; Methods and tools of geographical data collection; inter disciplinary character of geography research	10	2	-	12
Unit 3:	Various steps of scientific research writing: literature review, statement of the problem, formulation of objective, hypothesis, methodological layout of	10	2	-	12

	the research, research question, explanation and analysis part of research, referencing, bibliographic				
Unit 4:	Publication ethics in relation to the research, various types of research publication, principles of open access journal and other types: peer reviewed journal, Scopus index, Web of science, predatory publication, checking of plagiarism	10	2	-	12
Unit 5:	Intellectual property right, citation database, meaning of citation, use of citation, cite score, google scholar, H-Index, impact factor, scimago etc.	10	2	-	12
Total		50	10	-	60

Reading list:

Bird, A. (2006). Philosophy of Science. Routledge

MacIntyre, Alasdair (1967) A Short History of Ethics. London

Indian National Science Academy (INSA). Ethics in Science Education, Research and Governance (2019), ISBN:978-81-939482-1-7

P. Chaddah, (2018) Ethics in Competitive Research: Do not get scooped; do not get plagiarized, ISBN: 978-9387480865

Bcall, J. (2012). Predatory publishers are corrupting open access, Nature, 489(7415), 179-179.

Resnik, D.B. (2011). What is ethics in research & why is it important. National Institute of Environmental Health Sciences, 1-10.

Group C:

Title of the Course	Introduction to Regional Development Planning
Course Code	GGY-3-DSC-5064 (C)
Total Credit (Theory)	4 (3-1-0)
Contact hours	60
Distribution of Marks	80+20 (End Semester + In Semester)
Course outcomes	Students would be able to know and understanding of regional development, its approaches, regionalization techniques and the need for conservation and management of resources for development.

Unit	Content	Lecture (L)	Tutorial (T)	Practical (P)	Total Hours
Unit I	The Concept of region, regional planning, regional development, regionalization and regionalism. Basic principles and objectives of regional planning. Types of regional planning: sectoral, spatial and temporal planning Approaches to regional planning: Synoptic, functional and ad-hoc or specific	10	2	-	12
Unit II	Concept of resource regions Conservation and management of resources for regional development	6	1	-	7
Unit III	Theories of spatial distribution:	16	3	-	19

	• Growth Pole theory of Perroux and Boudeville • Core-periphery theory of Frederick • Cumulative causation theory of Gunnar Myrdal • Multi-level Growth Foci concept of R. P. Misra				
Unit IV	Methods of regionalization and techniques of regional planning: Analytical and Procedural	10	2	-	12
Unit V	Regional Development Planning for sustainable development: Some perspectives from the developed and developing nations.	8	2	-	10
Total		50	10		60

Suggested Readings:

Banerjee, A. and Kar. B., 1999: Economic Planning and development of North Eastern States, Kanishka Publications, New Delhi.

Choud, M. and Puri, V. K., 1983: Regional Planning in India, Allied Publications, New Delhi.

Deb, B. J., 1995: Regional Development in North East India, Reliance Publications, New Delhi.

Friedman, J. and William Alonso (eds), 1964: Regional Development and Planning, Cambridge, Mass. M.I.T. Press.

Friedman, J., 1973: Utilization, Planning and National Development, Bererly Hills, Sage Publications.

Gallion, A. B. and Simon Eisner, 1974: The Urban Pattern: City Planning and Design, East West Press Pvt. Ltd., New Delhi and Van Norstrand Reinhold Co.

Glasson, J., 1974: An Introduction to Regional Planning, Hutchinson Educational Ltd., London.

Gogoi, J. K., 1978: The Government of India's Policy for Regional Development- A Summing Up and a Critique, North Eastern Econ. Rev. II (3), July- Sept.

Goswami, A., 1981: Assam's Industrial Development: Urgency of New Direction, Econ. Pol. Weekly, XVI (21)

Hilhorst, J.G.M. and Dunham, D.M., 1971: Issues in Regional Planning, Institute of Social Studies, The

Hague.

Holier, G. P., 1988: Regional Development, in Michael Pacione (ed.), The Geography of the Third World: Progress and Prospect, Rutledge, London and New York.

Isard, Walter et al, 1998: Methods of Interregional and Regional Analysis, Ashgate Publishing Ltd., Aldershot.

Kidwai, A. H., 1985: Disparities in the Levels of Regional Development and Spatial Differentiation in India in the Historic Context, CSRD, JNU, Mimeo.

Mishra, R. P., Sundaram, K.V. and Rao, P., V.L.S., 1974: Regional Development Planning in India; A New Strategy, Vikas Publications, New Delhi.

Mishra, R.P., 1992: Regional Planning; Concept, Techniques, Policies and Case Studies, Concept Publications, New Delhi.

Mohapatra, A.C., 1985: The Concept of region, Hill Geographer, IV (1)

Mohapatra, A.C. and Rootray, J.K., 1998: Regional Development and Planning, Rawat, Jaipur.

Mukherjee, A., 1991: Methodology and Database for Decentralized Planning, Heritage, New Delhi.

Mukherjee, A., 1993: A Perspective Plan for A Hill District, Heritage, New Delhi.

Pannarselvam, A., 1999: Regional Development in the Developing Countries: A Search for Appropriate Theory, Space, 12 (2).

Ridell, R., 1985: Regional Development Policy, St. Martin's Press, New York.

Sandesara, J.C., 1992: Industrial Policy and Planning, 1947-91: Tendencies, Interpretations and Issues, Sage Publications, New Delhi.

Sanyal, B. M., 2001: India: Decentralized Planning, Concept, New Delhi.

Smith, B.C., 1965: Regionalism, Action Society Trust, London.

Title of the Course	Regional Development Planning in India & SAARC Countries
Course Code	GGY-3-DSC-5074 (C)
Total Credit (Theory)	4 (3-1-0)
Contact hours	60
Distribution of Marks	80+20 (End Semester + In Semester)
Course outcomes	• Students would be able to know and understanding of regional development, its approaches, regionalization techniques and the need for conservation and management of resources for development. • Students would be able to explain the formation, structure, regional significance, environmental issues and economic cooperation framework of SAARC countries.

Unit	Content	Lecture (L)	Tutorial (T)	Practical (P)	Total Hours
Unit I	Regional Planning in developed world and developing world Regional development perspectives in Israel, Netherlands, China.	10	2	-	12
Unit II	Regional Planning in India in relation to Five Year Plans, Planning Commission and NITI Aayog	8	2	-	10
Unit III	Planning for problems areas, depressed regions Area Development Case studies of regional development planning exercises - National Capital Region; North East Council; Concept of Physical Plan, Neighborhood planning	8	1	-	9

Unit IV	Decentralization and Multi-level planning in India Town and Country Planning Urban policy and urban planning in India Physical expansion of cities, open and green space, urban island	8	2	-	10
Unit V	Historical Background of SAARC formation and its role in geo-political and strategic significance. Physical, climatic, vegetation, population and resource scenario of SAARC countries. Formation of SAARC and its organizational structure, executive bodies, general member countries, role in regional cooperation, challenges, cross border issues. Programmes and policies under SAARC and its role in regional and global economies. Environmental issues and developmental planning in the context of sustainable development goals. Trade relation and cooperation towards regional economic development.	16	3	-	19
Total		50	10		60

Reading Materials:

- Banerjee, A. and Kar. B., 1999: Economic Planning and development of North Eastern States, Kanishka Publications, New Delhi.
- Choud, M. and Puri, V. K., 1983: Regional Planning in India, Allied Publications, New Delhi.
- Deb, B. J., 1995: Regional Development in North East India, Reliance Publications, New Delhi.
- Friedman, J. and William Alonso (eds), 1964: Regional Development and Planning, Cambridge, Mass. M.I.T. Press.
- Friedman, J., 1973: Utilization, Planning and National Development, Beverly Hills, Sage Publications.
- Gallion, A. B. and Simon Eisner, 1974: The Urban Pattern: City Planning and Design, East West Press Pvt. Ltd., New Delhi and Van Norstrand Reinhold Co.
- Glasson, J., 1974: An Introduction to Regional Planning, Hutchinson Educational Ltd., London.
- Gogoi, J. K., 1978: The Government of India's Policy for Regional Development- A Summing Up and a Critique, North Eastern Econ. Rev. II (3), July- Sept.
- Goswami, A., 1981: Assam's Industrial Development: Urgency of New Direction, Econ. Pol. Weekly, XVI (21)
- Hilhorst, J.G.M. and Dunham, D.M., 1971: Issues in Regional Planning, Institute of Social Studies, The Hague. 97
- Holier, G. P., 1988: Regional Development, in Michael Pacione (ed.), The Geography of the Third World: Progress and Prospect, Rutledge, London and New York.
- Isard, Walter et al, 1998: Methods of Interregional and Regional Analysis, Ashgate Publishing Ltd., Aldershot.
- Kidwai, A. H., 1985: Disparities in the Levels of Regional Development and Spatial Differentiation in India in the Historic Context, CSRD, JNU, Mimeo.
- Mishra, R. P., Sundaram, K.V. and Rao, P., V.L.S., 1974: Regional Development Planning in India; A New Strategy, Vikas Publications, New Delhi.
- Mishra, R.P., 1992: Regional Planning; Concept, Techniques, Policies and Case Studies, Concept Publications, New Delhi.
- Mohapatra, A.C., 1985: The Concept of region, Hill Geographer, IV (1)
- Mohapatra, A.C. and Rooray, J.K., 1998: Regional Development and Planning, Rawat, Jaipur.
- Mukherjee, A., 1991: Methodology and Database for Decentralized Planning, Heritage, New Delhi.
- Mukherjee, A., 1993: A Perspective Plan for A Hill District, Heritage, New Delhi.

Pannerselvam, A., 1999: Regional Development in the Developing Countries: A Search for Appropriate Theory, Space, 12 (2).

Ridell, R., 1985: Regional Development Policy, St. Martin's Press, New York.

Sandesara, J.C., 1992: Industrial Policy and Planning, 1947-91: Tendencies, Interpretations and Issues, Sage Publications, New Delhi.

Sanyal, B. M., 2001: India: Decentralized Planning, Concept, New Delhi.

Smith, B.C., 1965: Regionalism, Action Society Trust, London.

Title of the Course	Rural Development in India
Course Code	GGY-3-DSC-5084 (C)
Total Credit (Theory)	4 (3-1-0)
Contact hours	60
Distribution of Marks	80+20 (End Semester + In Semester)
Course outcomes	The students will be able to know the concepts related to the need and approaches to rural development, issues pertaining to rural economy, trends in rural development in India, the existing rural development programs and institutions and knowledge of successful case studies from India.

Unit	Content	Lecture (L)	Tutorial (T)	Practical (P)	Total Hours
Unit I	Understanding Rural Development: Concept, significance, approaches and indicators of rural development	6	2	-	8
Unit II	Rural Economic Base: concept and importance of agriculture sector allied activities in rural areas; need for expanding non-farm activities, programs and policies for non-farm sector. Issues of landholdings and land reforms	10	2	-	12
Unit III	Trends in rural development in India: Spatio-temporal perspectives on achievement and failures since 1951	8	2	-	10
Unit IV	Rural Development Programs in India: Poverty Alleviation Programmes; Programmes for Employment and Social Security; Other	10	2	-	12

	Development Programmes (PMGSY, MNREGA, PURA)				
Unit V	Rural Development Institutions and Case studies: Panchayati Raj institutions, Cooperatives, Training and Finance Institutions, and Voluntary organizations. Rural Development Experience (case study from India: Hiware Bazar, Maharashtra, Amul (Anand) Gujarat	15	3	-	18
Total		50	10		60

Reading Materials:

Venkata Reddy, K. Agriculture and Rural Development (Emerging Trends and Right Approach to Development), Himalaya Publishing House Pvt., Ltd., Mumbai, 2012.

Jain L.C. 1985, Grass without roots; Rural Development under Government Auspices, Sage Publications, New Delhi.

Seshadri, K. 1976, Political Linkages and Rural Development, National Publishing House, New Delhi.

Maheswari S. (1985) Rural Development in India, - A Public Policy Approach, Sage Publication, New Delhi.

Satyasundaram (1997), Rural Development, Himalaya Publishing House, New Delhi.

Singh. Katar. 2009. Rural Development Principles, Policies and Management. New Delhi: Sage Publications.

Sharma S.K and S.L. Malhotra. Integrated Rural Development: Approach, Strategy and Perspectives, New Delhi: Heritage.

Anand, Subhash. (2013). Dynamics of Rural Development. Delhi, India: Research India Press.

Krishnamurthy, J. (2000). Rural Development - Problems and Prospects. Jaipur, India: Rawat Pubs.

Singh, R.B. (1985): Geography of Rural Development. New Delhi, India: Inter India.

Misra, R. P. (ed.) (1985). Rural Development: Capitalist and Socialist Paths, Vol. 1. New Delhi, India: Concept.

Ramachandran, H., and Guimaraes, J.P.C. (1991). Integrated Rural Development in Asia– Learning fromRecent Experience. New Delhi, India: Concept Publishing.

Alam, S. M. et al., 1982: Settlement Systems of India, Oxford and IBH Publishing Co., New Delhi.

Bhat, L. S., 1976: Micro-Level Planning: A Case Study of Karnal Area, Haryana, Concept Publishing Co., New Delhi.

Blaikie, P. M., 1971: Spatial Organization of Agriculture in North Indian Village, Trans. Inst. British Geographer, Vol. 50. Chisholm, M., 1966: Geography of Economics, Bell, London.

Chisholm, M., 1967: Rural Settlements and Land Use, John Wiley, New York.

Title of the Course	Practical's on Regional Development Planning
Course Code	GGY-3-DSC-5094 (C)
Total Credit (Theory)	4 (0-0-4)
Contact hours	60
Distribution of Marks	80+20 (End Semester + In Semester)
Course outcomes	The students will be able to know the methods associated with the analysis of different regional development planning. The students will also learn the problems and prospects of regional development planning in a region with some practical exposure trips.

Unit	Content	Lecture (L)	Tutorial (T)	Practical (P)	Total Hours
Unit I: Practical Works (65 marks) (To attempt 5 questions carrying 13 marks each)	Regionalization using methods of: • Overlapping of different themes • Ranking using mean and standard deviation. • Factor analysis. Network analysis • Application of aggregate connectivity for regional development using alpha, beta, gamma and cyclomatic number • Application of shape and tortuosity indices for developing planning strategy			15	30
Unit II	Delimiting influence areas of nodal centers using:			15	30

	• Breaking point method • Gravity potential method and potential surface mapping Application of input-output analysis for prediction of short-range change in regional development. Exercises on shift share analysis for regional studies. Measuring regional disparity using Sopher's Disparity index; measurement of inequality using Gini Coefficient, Lorenz Curve and Location Quotient.				
Unit III: Practical Notebook and Viva - voce (15 marks)	Practical Notebook Assessment (10 marks) Viva-voce (5 marks)				
Total				30	60

Title of the course	Fundamental of Research Ethics and Scientific research writing
Course code	GGY-3-DSE-5104
Total Credit (Practical)	4 (3-1-0)
Contact hours	60
Distribution of Marks	80+20 (End Semester + In Semester)
Course outcomes	1. Students will be able to understand the meaning, concepts, principles, and importance of research ethics, ethical publication practices, authorship, plagiarism, and intellectual property rights in geographical research. 2. Students will acquire knowledge of different types of geographical data, methods and tools of data collection, interdisciplinary approaches, and the various stages of scientific research writing and publication. 3. Students will develop the ability to evaluate research publications, citation databases, indexing systems, and research impact indicators such as H-index, CiteScore, Impact Factor, Scimago, and identify predatory journals and plagiarism issues.

Unit	Content	Lecture	Tutorial	Practical	Total hours
Unit 1:	Meaning, concept and principles of ethical research Vs unethical research, research ethics with special reference to geography; Idea of ethical publications, authorship and plagiarism	10	2	-	12
Unit 2:	Data types and its collection in geographical research; Methods and tools of geographical data collection; inter disciplinary character of geography research	10	2	-	12

Unit 3:	Various steps of scientific research writing: literature review, statement of the problem, formulation of objective, hypothesis, methodological layout of the research, research question, explanation and analysis part of research, referencing, bibliographic	10	2	-	12
Unit 4:	Publication ethics in relation to the research, various types of research publication, principles of open access journal and other types: peer reviewed journal, Scopus index, Web of science, predatory publication, checking of plagiarism	10	2	-	12
Unit 5:	Intellectual property right, citation database, meaning of citation, use of citation, cite score, google scholar, H-Index, impact factor, scimago etc.	10	2	-	12
Total		50	10		60

Reading list:

Bird, A. (2006). Philosophy of Science. Routledge

MacIntyre, Alasdair (1967) A Short History of Ethics. London

Indian National Science Academy (INSA). Ethics in Science Education, Research and Governance (2019), ISBN:978-81-939482-1-7

P. Chaddah, (2018) Ethics in Competitive Research: Do not get scooped; do not get plagiarized, ISBN: 978-9387480865

Bcall, J. (2012). Predatory publishers are corrupting open access, Nature, 489(7415), 179-179.

Resnik, D.B. (2011). What is ethics in research & why is it important. National Institute of Environmental Health Sciences, 1-10.

Fourth Semester**DISSERTATION**

Title of the Course	DISSERTATION
Course Code	GGY-4-PRJ-511-16
Total Credit (Dissertation/Thesis)	16

Title of the Course component A	Dissertation
Contact hours	180 * 2 (360)
Distribution of Marks	80+20 (End Semester + In semester)
Course outcomes	Students will write a dissertation on suitable topic related to special paper applying all required methodology and dissertation writing procedure, that will cover outcomes like: 1. Research questions formulation 2. Literature review related to research 3. Methodological design 4. Analysis and interpretation 5. Maintaining of academic ethics, integrity, and IPR 6. Presentation of research and its defense

Unit	Content
Unit 1	1. Each student will have to prepare a dissertation under the guidance of respective teacher as per specialization following appropriate methodology, data base and literature review. 2. The dissertation duly signed by the guide concerned has to be submitted to the department at least one week before the scheduled date of examination.

	3. The marks distribution of dissertation in the final semester examination is as follows: a) Total marks: 80 b) Evaluation of Content: 70 (average between external and internal examiners) c) Viva-voce: 10 (exclusively by the external examiner)
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Title of the Course component	Viva-voce
Distribution of Marks	80+20 (End Semester + In semester)
Course outcomes	The candidate presented the major objectives, methodology, findings, and conclusions of the research work before the Viva-Voce Board. The candidate satisfactorily answered the questions and observations raised by the examiners and members present during the examination. The Board found that the research work demonstrates adequate originality, scientific rigor, and contributes significantly to the existing body of knowledge in the concerned discipline. After careful evaluation of the candidate in the Viva-Voce Examination, the Board unanimously recommends that the candidate be declared successful in the Viva-Voce Examination and be awarded the degree in subject to incorporation of the minor corrections/suggestions, if any, recommended by the examiners. The Board further certifies that the candidate has fulfilled all the requirements prescribed by the University for the award of the degree.

Title of the Course component	Field Study
Total Credit (Theory)	2 (1 credit= 30 hours)
Contact hours	30*2 (60)
Distribution of Marks	100
Course outcomes	• Apply theoretical concepts and disciplinary knowledge to real-world field situations and professional environments. • Conduct field investigations using appropriate research methodologies, data collection techniques, and analytical tools. • Evaluate socio-economic, environmental, or organizational issues and propose suitable solutions based on field observations. • Demonstrate effective communication, teamwork, leadership, and ethical conduct in professional and community settings. • Prepare and present comprehensive field study/internship reports incorporating evidence-based findings and recommendations.

Guidelines for Field Study

1. Objectives

- To provide practical training and experiential learning related to the student's field of study.
- To develop professional, technical, analytical, and communication skills.
- To familiarize students with workplace practices, organizational structures, and community realities.
- To bridge the gap between academic knowledge and practical application.

2. Duration and Placement

- Students should complete the prescribed duration of fieldwork as specified by the university curriculum.
- The placement may be undertaken in government departments, NGOs, research institutions, industries, educational institutions, or other relevant organizations approved by the department.

3. Supervision and Monitoring

- Each student shall work under the guidance of a field supervisor from the host organization and a faculty supervisor from the university.
- Regular monitoring, progress reviews, and consultations should be conducted throughout the study period.

4. Fieldwork Activities

- Students should actively participate in assigned tasks, data collection, project implementation, surveys, observations, or organizational activities relevant to the course objectives.
- Ethical standards, confidentiality, and institutional rules must be strictly followed.

5. Documentation and Reporting

- Students must maintain a field diary/logbook documenting daily activities, observations, and learning experiences.
- A comprehensive field study/internship report should be submitted at the end of the programme, including:
 - Introduction
 - Objectives
 - Methodology
 - Description of the organization/field area
 - Activities undertaken
 - Findings and observations
 - Challenges faced
 - Learning outcomes
 - Conclusion and recommendations

6. Assessment

- Evaluation may include attendance, field performance, supervisor's assessment, report submission, presentation, and viva-voce examination.
- Marks should be awarded according to the university's prescribed evaluation scheme.

Title of the Course	Advanced Techniques in Geographic Research
Course Code	GGY-4-DSE-5124
Total Credit (Theory)	4 (3-1-0)
Contact hours	60
Distribution of Marks	80+20 (End Semester + In Semester)
Course outcomes	1. Explain the concept, nature, and significance of research methodology in geography 2. Develop independent research skills for higher studies & professional applications in geography 3. Students will be able to apply PAC in geography research 4. Conduct field surveys, sampling, questionnaire design & data processing effectively

Unit	Content	Lecture	Tutorial	Practical	Total hours
Unit 1:	Identifying patterns, relation, regional variation Lorenz curve, Gini coefficient, distribution of inequality	10	2	-	12
Unit 2:	Regression, Correlation Multivariate analysis, PCA, Factor analysis	10	2	-	12
Unit 3:	Tools and Techniques in Geomorphological research, application of digital planimeter, digital theodolite Time-space analysis, spatial diffusion, traffic flow analysis,	10	2	-	12

	nearest neighbour statistics Location data, time series analysis, statistical model				
Unit 4:	Quantitative and mixed method-interview-interview, focus-group, transect analysis, resource inventory, participatory appraisal, ethnographic method, web-based mapping tools Interdisciplinary approach: natural, biological, social science	10	2	-	12
Unit 5:	Geo-spatial technologies-GIS, RS, GPS, Digital GPS, participatory GIS Geo-spatialization and cartographic techniques, 3 D mapping, interactive map Spatial modelling and simulation (Predictive, real-world geographic processes, land use model, applied area like climatic geomorphology, hazard management, urban planning Disaster management, vulnerability, risk reduction, capacity building	10	2	-	12
Total		50	10		60

Reading List

1. Hammond P. and McCullagh P. S., 1978: Quantitative Techniques in Geography: An Introduction, Oxford University Press.
2. Sarkar, A. (2013) Quantitative Geography. techniques and presentations. Orient Black Swan Private Ltd., New Delhi.
3. Yeates M., 1974: An Introduction to Quantitative Analysis in Human Geography, McGrawHill, New York. 26
4. Mathews, J.A., 1987: Quantitative and Statistical Approaches to Geography: A Practical Manual Pergamon, Oxford.

5. Mahmood, A., 1999: Statistical Methods in Geographical Studies, Rajesh Publications, New Delhi.
6. Elhance, D.N., 1972: Fundamentals of statistics, KitabMaha1, Allahabad
7. Monkhouse, F.J. Wilkinson, H.R., 1989: Maps Diagrams, B.I. Publications, New Delhi
8. Gregory, S., 1963: Statistical Methods and Geographers, Longman, London.