DGC: Course work for Ph.D. in Geography
Paper - III

Research Strategy & Orientation in Geography

Level: Doctoral	**Credits: 3**
Course Duration: One Semester (16 Weeks)	**Number of Lectures: 45**
Evaluation: Assignments, Seminar Presentations, Research Proposal, & Final Examination	

Unit 1:

Characteristics of Scientific Research, Interdisciplinary Nature of Research in Geography, Space and Place as Research Concepts; Pure vs. Applied Research; Qualitative, Quantitative, and Mixed-Method Approaches; Descriptive, Exploratory, Explanatory, and Experimental Research; Identifying Research Gaps; Framing Research Questions and Hypotheses in Geography, onceptual Frameworks in Geographic Research; Field-Based vs. Laboratory-Based Research in Geography; Spatial Sampling in Geographic Research

Unit 2:

Statistical Methods in Geography (Descriptive and Inferential);

Measures of Central Tendency: Mean, median, and mode; Measures of Dispersion: Range, variance, standard deviation; Frequency Distributions: Histograms, Frequency polygon and bar charts; Concept of Normal distribution.

Hypothesis Testing (e.g., t-test, chi-square test for spatial variations); Regression Analysis, Correlation, and Factor Analysis; ANOVA (Analysis of Variance) (e.g., comparing climate conditions across different geographic regions).

Spatial Statistics and Geostatistical Techniques; Nearest Neighbor, Spatial Autocorrelation (Moran's I, Geary's C) to measure clustering; Kernel Density; Spatial analysis and overlay techniques for thematic mapping; Spatial interpolation; Principal Component Analysis (PCA)

Introduction to SPSS & R; Map Automation using GeoJSON.

Unit 3:

Formatting and Citation Styles (APA, Chicago, Harvard, etc.); Writing Abstracts, Literature Reviews, and Methodology Chapters; Presenting Findings, Discussions, and Conclusions Research Publication and Ethics: Writing for Journals, Conferences, and Edited Volumes; Plagiarism, Copyright, and Ethical Issues in Geographic Research; Peer-Review Process and Impact Factor of Journals; Presentation and Communication of Research: Designing Posters and Oral Presentations; Use of PowerPoint, LaTeX, and Other Tools for Scientific Communication; Effective Public Speaking and Defense of Research

Suggested Readings

1. Creswell, J. W. (2018). *Research design: Qualitative, quantitative, and mixed methods approaches* (5th ed.). Sage.
2. Montello, D. R., & Sutton, P. C. (2020). *An introduction to scientific research methods in geography and environmental studies* (3rd ed.). Sage.
3. Bhatt, P. R. (2009). *Research methodology in geography*. Rajesh Publications.
4. Agnew, J. (2011). *Space and place: The perspective of experience*. University of California Press.
5. Harvey, D. (2009). *Explanation in geography*. Rawat Publications.
6. शुक्ल, आर. (2014). *भूगोल में अनुसंधान की प्रविधियाँ*. विश्वविद्यालय प्रकाशन.
7. Kitchin, R., & Tate, N. (2013). *Conducting research in human geography: Theory, methodology and practice* (2nd ed.). Routledge.
8. Kumar, R. (2019). *Research methodology: A step-by-step guide for beginners* (5th ed.). Sage.
9. Rogerson, P. A. (2019). *Statistical methods for geography: A student's guide* (4th ed.). Sage.
10. Mahmood, A. (2002). *Statistical methods in geographical studies*. Rajesh Publications.
11. Gupta, S. C. (2018). *Fundamentals of statistics*. Himalaya Publishing House.
12. Saxena, H. M. (2017). *Quantitative geography*. Rawat Publications.
13. Bivand, R. S., Pebesma, E., & Gómez-Rubio, V. (2013). *Applied spatial data analysis with R* (2nd ed.). Springer.
14. Fotheringham, A. S., Brunsdon, C., & Charlton, M. (2000). *Quantitative geography: Perspectives on spatial data analysis*. Sage.
15. Chaudhary, M. (2014). *Spatial statistics: A geoinformatics approach*. Concept Publishing.
16. Field, A. (2018). *Discovering statistics using IBM SPSS statistics* (5th ed.). Sage.
17. Wickham, H. (2016). *ggplot2: Elegant graphics for data analysis*. Springer.
18. Longley, P. A., Goodchild, M. F., Maguire, D. J., & Rhind, D. W. (2015). *Geographic information systems and science* (4th ed.). Wiley.
19. Purdue University. (2023). *APA manual 7th edition: A guide to citation and referencing*. Purdue OWL.
20. Turabian, K. L. (2018). *A manual for writers of research papers, theses, and dissertations* (9th ed.). University of Chicago Press.
21. गुप्ता, वी. (2015). *शोध लेखन और संदर्भ प्रणाली*. प्रकाशन विभाग, भारत सरकार.
22. Kumar, R. (2014). *Research methodology: A step-by-step guide for beginners*. Sage.
23. Singh, P. (2016). *Ethics in research and publication*. Springer.
24. Das, A. (2021). *How to write and publish a scientific paper in geography*. Rawat Publications.
25. Alley, M. (2018). *The craft of scientific presentations: Critical steps to succeed and critical errors to avoid* (2nd ed.). Springer.
26. Reynolds, G. (2012). *Presentation zen: Simple ideas on presentation design and delivery* (2nd ed.). New Riders.
27. Beins, B. C. (2017). *Research method and design in psychology* (2nd ed.). Cambridge University Press.

DGC: Course work for Ph.D. in Geography
Paper - IV

Field & Lab Methods in Physical & Human Geography

Level: Doctoral	**Credits: 3**
Course Duration: One Semester (16 Weeks)	**Number of Lectures: 45**
Evaluation: Assignments, Seminar Presentations, Research Proposal, & Final Examination	

Unit 1:

Morphometric analysis: slope, aspect, and elevation measurement; Field-based geomorphological mapping techniques; Groundwater assessment techniques: well inventory, piezometric mapping**;** Soil sampling techniques and lab-based petrographic analysis; Sediment sampling and sediment grain-size analysis; On-site meteorological data collection (temperature, humidity, wind speed).

Writing a physical geography field report: structure, data presentation, and conclusions.

Unit 2:

Designing questionnaires and structured/unstructured interviews, Sampling techniques for socio-economic surveys; Conducting focus group discussions (FGDs); Ethnographic and participant observation methods; Participatory Rural Appraisal (PRA) Techniques; Mapping and Ground Truthing; Transect Studies and Quadrant Sampling.

Cognitive mapping and perception studies, Participatory GIS (PGIS) and community mapping, Case study approach in cultural geography, Documenting landscapes and place identities.

Qualitative data analysis: coding and thematic analysis; Quantitative methods: statistical correlation, regression models; GIS applications in human geography research.

Structuring a human geography field report: integrating theory, data, and findings; writing reports on socio-economic contexts; Thematic mapping of socio-economic aspects: Choropleth, dot density, proportional symbol, and isopleth maps;

Unit 3:

Remote Sensing & GIS in Research: GPS and Remote Sensing-Assisted Data Collection; Census, Meteorological, and Socioeconomic Datasets; Use of GIS Databases and Spatial Archives; Data formats and conversion: raster vs. vector models; Georeferencing, digitization, and topology creation; Database management and spatial indexing for efficient mapping; Spatial Data Processing and Visualization, Image Interpretation and Classification, GIS-Based Spatial Modeling and Simulation.

Cartographic generalization and symbolization techniques; Map Design, Evaluation, and Publishing: Principles of effective map design (color schemes, typography, legend design); Cartographic standards and metadata documentation; Map evaluation techniques: usability testing and readability assessment; Publishing maps for academic, policy, and public outreach purposes; Geospatial storytelling using platforms like StoryMaps, Google Earth Studio

Suggested Readings

1. Strahler, A. N. (1952). *Hypsometric (area-altitude) analysis of erosional topography*. Geological Society of America Bulletin, **63**(11), 1117-1142.
2. Thornbury, W. D. (2004). *Principles of geomorphology* (2nd ed.). Wiley.
3. Kale, V. S., & Gupta, A. (2001). *Introduction to geomorphology*. Universities Press.
4. Todd, D. K., & Mays, L. W. (2005). *Groundwater hydrology* (3rd ed.). Wiley.
5. Raghunath, H. M. (2006). *Groundwater* (2nd ed.). New Age International Publishers.
6. सतीश, सी. (2016). *मृदा विज्ञान एवं भूजल अध्ययन*. प्रकाशन विभाग, भारत सरकार।
7. Pettijohn, F. J. (1987). *Sedimentary rocks* (3rd ed.). CBS Publishers.
8. Lal, D. S. (2020). *Climatology*. Sharda Pustak Bhawan.
9. Singh, S. (2014). *Physical geography*. Prayag Pustak Bhawan.
10. Gregory, K. J., & Walling, D. E. (1973). *Drainage basin form and process: A geomorphological approach*. Wiley.
11. Summerfield, M. A. (1991). *Global geomorphology*. Pearson Education.
12. छाबड़ा, टी. (2018). *भूगोल में शोध एवं फील्ड रिपोर्ट लेखन*. यूनिवर्सिटी प्रेस।
13. Bryman, A. (2015). *Social research methods* (5th ed.). Oxford University Press.
14. Kitchin, R., & Tate, N. (2013). *Conducting research in human geography* (2nd ed.). Routledge.
15. Singh, S. (2019). *Research methods in geography: A practical guide*. Rawat Publications.
16. Chambers, R. (1994). *Participatory rural appraisal (PRA): Analysis of experience*. World Development, **22**(9), 1253-1268.
17. Bernard, H. R. (2017). *Research methods in anthropology: Qualitative and quantitative approaches* (6th ed.). Rowman & Littlefield.
18. सरन, आर. (2015). *ग्रामीण विकास और भागीदारी मूल्यांकन तकनीक*. प्रकाशन विभाग, भारत सरकार।
19. Dent, B. D., Torguson, J. S., & Hodler, T. W. (2009). *Cartography: Thematic map design* (6th ed.). McGraw-Hill.
20. Slocum, T. A. (2008). *Thematic cartography and geovisualization* (3rd ed.). Pearson.
21. Saxena, H. M. (2017). *Economic geography*. Rawat Publications.
22. Creswell, J. W. (2018). *Research design: Qualitative, quantitative, and mixed methods approaches* (5th ed.). Sage.
23. Babbie, E. (2020). *The practice of social research* (15th ed.). Cengage Learning.
24. Mahmood, A. (2002). *Statistical methods in geographical studies*. Rajesh Publications.
25. Clifford, N., Cope, M., Gillespie, T., & French, S. (2016). *Key methods in geography* (3rd ed.). Sage.
26. Flowerdew, R., & Martin, D. (2013). *Methods in human geography: A guide for students doing a research project* (2nd ed.). Routledge.
27. Jensen, J. R. (2016). *Remote sensing of the environment: An earth resource perspective* (2nd ed.). Pearson.
28. Lillesand, T., Kiefer, R. W., & Chipman, J. (2015). *Remote sensing and image interpretation* (7th ed.). Wiley.
29. Nag, P., & Kudrat, M. (1998). *Digital remote sensing*. Concept Publishing.
30. तोमर, एस. (2017). *भौगोलिक सूचना प्रणाली (GIS) और रिमोट सेंसिंग*. प्रयाग पुस्तक भवन।

31. Goodchild, M. F., Longley, P., Maguire, D., & Rhind, D. (2015). *Geographic information systems and science* (4th ed.). Wiley.
32. Burrough, P. A., & McDonnell, R. A. (2015). *Principles of geographical information systems* (3rd ed.). Oxford University Press.
33. DeMers, M. N. (2017). *Fundamentals of geographic information systems* (5th ed.). Wiley.
34. Brewer, C. A. (2015). *Designing better maps: A guide for GIS users* (2nd ed.). Esri Press.
35. Robinson, A. H., Morrison, J. L., Muehrcke, P. C., Kimerling, A. J., & Guptill, S. C. (1995). *Elements of cartography* (6th ed.). Wiley.
36. Keates, J. S. (1996). *Understanding maps* (2nd ed.). Routledge.
37. Dykes, J., MacEachren, A. M., & Kraak, M. J. (2005). *Exploring geovisualization*. Elsevier.
38. ESRI. (2020). *StoryMaps: A guide to storytelling with maps*. Esri Press.
39. Peterson, M. P. (2020). *GIS and multimedia for mapping and storytelling*. Springer.