Savitribai Phule Pune University

Syllabus for Ph.D. Course work: Geography

From the academic year 2025-26

This syllabus is prepared as per Savitribai Phule Pune University Circular No. 98/2025 issued by Academic Section (Approval Cell) dated 08/04/2025.

The syllabus will be applicable for all research centres offering Ph.D. programme affiliated to the Savitribai Phule Pune University.

Ph.D. Course Work in Geography
(Total Credits – 16)
Course Work Structure

Sr. No.	Course No.	Name of the Course	Credits	No. of Teaching Hours	Responsibility
1	GG.Ph.D. 001	Research Methods in Geography	04	60	Research Center & research Supervisor
2	GG. Ph.D. 002	Research Paper Presentation	01	-	Attending and presenting at least one research paper in Seminar/ Conference/Workshop (Internation/National/) Research Center & research Supervisor
Two Subject specific advanced level courses (Any two courses from GG. Ph.D. 003, GG. Ph.D. 004, GG. Ph.D. 005 and GG. Ph.D. 006)					
3	GG. Ph.D. 003	Contemporary Techniques in Geography	04	60	Research Center
4	GG. Ph.D. 004	Advances in Physical Geography	04	60	Research Center
5	GG. Ph.D. 005	Advances in Human Geography	04	60	Research Center
6	GG. Ph.D. 006	Applied Geospatial and Statistical Techniques in Geography	04	60	Research Center
7	GG. Ph.D. 007	Research and Publication Ethics	02	30	Research Center shall conduct the UGC approved 02 credits course as per UGC letter No. D.O.F. 1-1/2018 (Journal/CARE) Dated Dec.2019 and SPPU circular No. 65/2020 dated 3rd march 2020 **OR** Research Scholar can complete the Research and Publication ethics course run by the Centre of Publication Ethics SPPU.
8	GG. Ph.D. 008	Pedagogical Training/ Industrial Visit Report /Field Work/ Assessment Statement	01	30	Research Center & research Supervisor
Total			**16**	**240**	

Detail Syllabus of Each Course

Course Code: GG.Ph.D. 001: Research Methods in Geography
Credits: 04

Purpose- This course is one of the common courses that will train the Ph.D. students in basic research methods and carry out research efficiently.

Module No.	Module	Contents	Hours
1.	Introduction to research in geography	i. Historical review of Geographic Research ii. Procedure of Scientific Research: Deductive and Inductive approach iii. Geography as Spatial Science: concepts and models in geography iv. Evolution of contemporary geographic thoughts and concepts v. Logical and scientific thinking in geography vi. Systematic approach in geography vii. Overviews of recent research trends in geography	15 hrs
2.	Research methodology in geography	i. Defining of the research problem and purpose ii. Literature review process, types of literature, understanding major trends, patterns and gaps in research iii. Selection of research topic, iv. Hypothesis, aims and objectives, v. Research design: research question and appropriate methods, vi. Acquisition of data: sources of data, methods of data collection, questionnaire designing, experimental studies, methods and techniques of sampling in Geography	15 hrs
3.	Data Analysis	i. Types of data, Techniques of data collection, their verification, sampling methods ii. Qualitative and quantitative approaches iii. Climate and hydrologic data: obtaining data, station and gridded data, processing of data iv. Statistical analysis: bivariate and multivariate data, statistical significance v. Multi-criteria analysis: examples from geography vi. Computation of human development index, gender development index and their applications vii. Various software(s) for statistical and geographic analysis viii. Error and noise in analysis, curve fitting	20 hrs
4.	Writing of Research Report	i. Format and arrangement of the text, ii. Writing plain English iii. Presentation of data and results, iv. Citations and References: introduce reference management software(s) v. Synonymies and Abbreviations vi. Appropriate crediting vii. Writing research proposal and research paper viii. Filing patents	10 hrs

The contact hours will be around 60 based on assignments and examinations. The examination for each module will be separately performed.

References:

Gomez, B., & Jones III, J. P. (2021). Research methods in geography: A critical introduction (2nd ed.). Wiley-Blackwell.

Harder, C., & Wright, D. J. (2020). GIS for science: Applying mapping and spatial analytics (Vol. 2). Esri Press.

Harris, R., & Jarvis, C. (2020). Quantitative geography: The basics. Sage Publications.

Hay, I. (2021). Qualitative research methods in human geography (4th ed.). Oxford University Press.

History of the Scientific Methods - by Martin Shuttleworth, https://explorable.com/history-of-thescientific-method.

Holloway, S. L., Rice, S. P., & Valentine, G. (Eds.). (2022). Key concepts in geography (3rd ed.). Sage Publications.

Murray, R. (2022). Writing for academic journals (4th ed.). Routledge.

Parry, J. T., & Robinson, K. W. (Eds.). (2020). Doing fieldwork in the Global South: Ethical and methodological perspectives. Routledge.

The Statistical Analysis of Experimental Data - by, John Mandel, ISBN: 0486646661, ISBN13:9780486646664

Wilson, J. P. (Ed.). (2022). Geographic information science and technology body of knowledge (2nd ed.). UCGIS.

Course Code: GG. Ph.D. 002: Research Paper Presentation
Credits 01

The candidate will attend and present at least 1 paper in an international/national conference/Seminar/Workshop
Weightage for this course is 01 credit

It is highly desired that candidate shall present his/her research work in the Seminar/ Conference/Workshop etc. (National/International)

Responsibility: Research Center and Research Supervisor

Course Code: GG.Ph.D. 003 : Contemporary Techniques in Geography
Credits 04

Module No.	Module	Contents	Hours
1	Research Techniques in Physical Geography-I	i. Morphometric Analysis of Drainage Basin: Channel Geometry and Planform Analysis; Measurement of Hydraulic Radius and Efficiency; Estimation of Discharge and Velocity ii. Physical Analysis of Sediments: Particle Size Determination and Distribution; Estimation of Specific Gravity and Bulk Density; Facies Analysis iii. Quantitative Hydrology: Rating Curve; Flood Frequency Analysis; Flood Area Estimation from Satellite Imagery; Estimation of Infiltration and Potential Evapotranspiration	10 hrs
2	Research Techniques in Physical Geography-II	i. Mapping and Representation of Weather Data: Time Series Analysis of Climatic Data; Mean and Standard Error Estimation of Weather Data; Synoptic Station Model; Measurement of Evapotranspiration ii. Quantitative Analysis of Environmental Data: Measurement of Noise Level; Measurement of CO2 Level; Dust Fall Estimation iii. Chemical Analysis of Soil Sample: Organic Carbon; Electrical Conductivity; Alkalinity; Laboratory Techniques for Water Quality Analyses: Measurement of Dissolved Oxygen, BOD and COD of Water; Total Suspended Solids; Total Dissolved Solids, Water Quality Index.	10 hrs
3	Research Techniques in Human Geography	i. Spatial Distributions and Interactions: Nearest Neighbour Analysis; Gravity Model; Dispersion and Concentration of Settlements; Mean Centre of Population and Standard Distance Measure; Shifting Of Mean Centres ii. Measures of Inequality: Lorenz Curve and Gini's Coefficient; Location Quotient; Index of Similarity and Dissimilarity iii. Network Analysis: Detour Index; Transport Indices(Koning Number; Alpha, Beta, and Gama Indices); Shortest Path Matrix (Shimble'sIndex), Smeed's Index, Route Shape Analysis	15 hrs
4	Statistical Techniques	i. Descriptive and inferential statistics ii. Correlation analysis, Bivariateand multivariate Regression models,TSA,PCA and FA	10 hrs
5	Geoinformatics	i. GIS data types and characteristics, GIS softwares: Open source and commercial-their usage for different studies Understanding and choosing a proper projection ii. RS techniques: Digital image processing (DIP), DEM Generation and analysis, Classification, accuracy assessment. Change detection analysis, Projections and predictions of a parameter GIS techniques: Spatial data analysis, Multiple criteria analysis, ANN, Geostatistics: concept and applications in Geography, auto correlation, Variograms and methods of interpolation	10 hrs
6	Cartographic techniques	i. Representation of data through graphs, maps and Flow charts	5 hrs

References

Black, P.E. (1991): Watershed hydrology. London: Prentice Hall.
Blunden, J., Haggett, P., Harnnett, C. and Sarre, P. (1985): The fundamentals of human geography. New York: Harper and Row.
Burrough P. A., and McDonnell, R. A. (2000): Principles of Geographical Information System.

Oxford: Oxford University Press.
Clark, J. I. (1973): Population geography. Oxford: Pergamum Press Ltd.
Fotheringham, A.S., Brunsdon, C. and Charlton, M. (2007): Quantitative geography: perspectives on spatial data analysis. New Delhi: SAGE Publications India Pvt. Ltd. 24
Gilbert, R.O. (1987): Statistical methods for environmental pollution monitoring. New York: John Wiley and Sons.
Pal, S.K. (1999): Statistics for geoscientists. New Delhi: Concept publishing Company
Hesse, P.R., and Hesse, P. R. (1971): A textbook of soil chemical analysis. Cambridge: Cambridge University Press.
Heywood, D.I., Cornelius, S. and Carver, S. (2011): An introduction to Geographical Information Systems. Harlow; Toronto: Prentice Hall.
Johnston, R.J. (1978): Multivariate statistical analysis in geography: a primer on the general linear model.
Lillesand, T.M. and Kiefer, R.W. (1994): Remote sensing and image interpretation. New York: John Wiley and Sons.
Longley, P.A., Goodchild, M.F., Maguire, D.J., and Rhind, D.W. (2005): Geographic Information Systems and science. New York: John Wiley & Sons.
Murty, J. V. S. (1998): Watershed management. New Delhi: New Age International.
Najma Khan (2000): Quantitative methods in geographical research. New Delhi: Concept PublishingCompany.
Raghunath, H.M. (2006): Hydrology: Principles, Analysis and Design New Delhi: New Age International (P) Limited Publishers.
Rama Sastry, A.A. (1984): Weather and weather forecasting. New Delhi: Government of India
Robinson, G.M. (1998): Methods and techniques in human geography. New York: John Wiley & Sons.
Smith, D.M. (1977): Patterns in human geography. London: Penguin Books.
Sabins, F.F. (1997): Remote sensing: principles and applications. New York: W.H. Freeman and company.
Sahu, K.C. (2007): Textbook of remote sensing and Geographical Information Systems. New Delhi: Atlantic Publishers.
Yeates, M.(1974): An introduction to quantitative analysis in human geography. New York: Mc Graw Hill.

Course Code: GG.Ph.D. 004: Advances in Physical Geography
Credits: 04

SN	Module	Contents	Hours
1	Geomorphology	i. Introduction to the Discipline of Geomorphology ii. Geomorphology: Its Early History iii. The Nature and Explanation in Geomorphology iv. The Role and Character of Theory in Geomorphology v. Geomorphology and Environmental Management vi. Geomorphology and Society	15 hrs
2	Climatology	i. The Basis of Modern Climatology ii. Climatology: A Brief History iii. Atmospheric Variables and Data Acquisition iv. Weather Analysis and Forecasting v. Air Pollution vi. The Changing Climate: Future Projections, Different Scenarios vii. Hydrology and Water Resources	15 hrs
3	Soils and Soil Resources	i. Composition of Soil Substances, Formation of Soils and Relationship with Geographical Environments ii. Introduction to Soil Classification System iii. Soil Classification and Spatial Distribution Pattern of Soils iv. Soil Data	15 hrs
4	Environmental Geography	i. Terrestial and Aquatic Ecosystems ii. Biosphere on the Earth, Biology and Environment iii. Plant population, community and ecosystem iv. Different Ecosystems on Earth v. Biodiversity and Protection	15 hrs

References:

Birkeland, P. W (1999). Soils and Geomorphology. New York: Oxford University Press.

Brady, N. C., & Weil, R. R. (2008). The Nature and Properties of Soils. New Jersey: Prentice Hall.

Bridges, E. M., & Davidson, D. A. (1982). Principles and Applications of Soil Geography. London: Longman Group.

Chandana, R.C., 2014. Geography of Population. Kalyani Publishers, New Delhi.

Gregory, K.J. and Goudie, A.C., 2011. The SAGE Handbook of Geomorphology, Sage, London.

Hartshorn, T.A. and Alexander, J.W., 2013. Economic Geography. Pearson Education, Jersey.

Huggett, R. J. (2022). Fundamentals of geomorphology (5th ed.). Routledge.

Gregory, K. J. (Ed.). (2020). The Earth's land surface: Landforms and processes in geomorphology (2nd ed.). Routledge.

Lutgens, F. K., Tarbuck, E. J., & Tasa, D. (2021). The atmosphere: An introduction to meteorology (14th ed.). Pearson.

Barry, R. G., & Chorley, R. J. (2023). Atmosphere, weather and climate (10th ed.). Routledge.

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Brady, N. C., & Weil, R. R. (2022). The nature and properties of soils (16th ed.). Pearson.

Botkin, D. B., & Keller, E. A. (2021). Environmental science: Earth as a living planet (11th ed.). Wiley.

Cunningham, W. P., & Cunningham, M. A. (2020). Environmental science: A global concern (15th ed.). McGraw Hill.

Lutgens, F.K. and Tarbuck, E.J., 2013. The Atmosphere. Prentice Hall, Pearson, New York.

Oliver, J.E. and Hindore, J.J., 2003. Climatology. Pearson Education, Singapore.

Pitty, A. F. (1978). Geography and Soil Properties, London: Methuen and Co.

Singh, R.Y., 2007. Geography of Settlements. Rawat Publications, Jaipur.

Course Code: GG. Ph.D. 005: Advances in Human Geography
Credits: 04

SN	Module	Contents	Hours
1	Economic Geography	i. Introduction and classification of economic activities. ii. Elements of market place. iii. Geography of Finance, Labour, & Indian economy iv. Bases of spatial interaction- connectivity, accessibility v. SEZ (Special economic zone), EPZ (Export Processing Zone vi. Transport and Trade: concept, theories and policy	15 hrs
2	Social & Cultural Geography	i. Social background and its development ii. Social welfare policies and facilities iii. Social well being iii. Introduction of cultural region, cultural ecology, cultural integration and cultural landscape iv. Cultural diversity and transformation	15 hrs
3	Agriculture and Industrial Geography	i. Agriculture System : Problem, Planning & Management ii. Theories of agricultural location based on several multi- dimensioned factors. iii. Crop: efficiency, productivity, diversification, specification iv. Industrial dynamics, industrial development & environment v. Industrial restructuring , development and impact	15 hrs
4	Population & Settlement Geography	i. Approaches to the study of population: Regional, Ecological ii. Sources & analytical techniques of population data iii. Growth of population, Urbanization, Migration, HDI iv. History & Growth of Settlement v. Theories and Models of Settlement	15 hrs

References:

Alexander J.W. (1976): Economic Geography, Prentice Hall of India. New Delhi.

Alexanderson G. (1988): Geography of manufacturing, Prentice Hall of India. New Delhi.

Birdsell N., Kelley A.C., Sinding S. (2003): Population Matters: Demographic Change,

Bogue, Donald (1969): Principles of Demography, John Wiley, New York.

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Dicken, P. (2021). Global shift: Mapping the changing contours of the world economy (8th ed.). Sage Publications.

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Johnston, R. J., Gregory, D., Pratt, G., & Watts, M. (2020). The dictionary of human geography (6th ed.). Wiley-Blackwell.

King, L.J., Golledge R.G. (1978): Cities, Space & Behavior, Prentice Hall, Engle wood cliff, New Jersey.

Knox, P. L., & Agnew, J. A. (2020). The geography of the world economy (7th ed.). Routledge.

Mandal, R.B. (2000): Urban Geography, Concept Publishing Co., New Delhi.

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Mitchell, D. (2020). Cultural geography: A critical introduction (2nd ed.). Wiley-Blackwell.
Mosely, M.J. (2005): Rural Development: Principles and Practice. Sage Publication, London.
Newell C. (1990): Methods and Models in Demography, Guilford Press; 1st edition.
Pacione, M. (2009): Urban Geography-A Global Perspective. 3rd edition.
Pain, R., & Smith, S. J. (Eds.). (2021). Introducing social geographies (3rd ed.). Routledge.
Singh Jasbir & Dhillon S.S (1970): Agricultural Geography, New Delhi.
Watts H.D. (1987): Industrial Geography, Longman scientific and Technical, New York.
Woods, R. (2021). Population geography: Tools and issues (2nd ed.). Routledge.
Pacione, M. (2020). Urban geography: A global perspective (3rd ed.). Routledge.

Course Code: GG.Ph.D. 006: Applied Geospatial and Statistical Techniques in Geography
Credits: 04

SN	Module	Contents	Hours
1	Fundamentals of Geospatial data	i. Spatial v/s non-spatial data ii. Types of Remote Sensing data (optical, thermal, radar) iii. Data formats (raster and vector) iv. Co-ordinate systems and Projections v. Digital Elevation Models and their use in terrain analysis	10 hrs
2	Training in GIS software	i. Introduction to QGIS / ArcGIS ii. Acquisition of satellite images iii. Georeferencing, digitization, and data layering iv. Unsupervised and Supervised Image Classification v. Accuracy Assessment and Kappa Statistics	15 hrs
3	Spatial Analysis and Modelling	i. Spatial Interpolation Techniques ii. Overlay and Buffer Analysis iii. Hotspot analysis iv. Suitability Modelling using Multi-Criteria evaluation (MCE)	15 hrs
4	Applied Statistical Analysis	i. Introduction to Excel / Excel Stat / SPSS ii. Descriptive statistics for spatial datasets iii. PCA and Cluster Analysis in geographic studies iv. Time Series analysis (Trend analysis)	15 hrs
5	Applications	i. Design a geospatial/statistical analysis project ii. Data visualisation and interpretation iii. Report / Presentation	5 hrs

References:

Bolstad, P. (2023). GIS fundamentals: A first text on geographic information systems (7th ed.). XanEdu Publishing.

Burrough, P. A., & McDonnell, R. A. (2022). Principles of geographical information systems (3rd ed.). Oxford University Press.

Burrough, P.A., McDonnell, R.A. and Lloyd, C.D., 2015. Principles of Geographical Information Systems, Oxford University Press, Oxford.

Hammond, R. and McCullagh, P.S., 1974. Quantitative Techniques in Geography: An Introduction, Clarendon Press, Oxford.

Jensen, J. R., & Hodgson, M. E. (2022). Introductory digital image processing: A remote sensing perspective (5th ed.). Pearson.

Johnston, R.J., 1973. Multivariate Statistical Analysis in Geography, Longman, London.

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Lillesand, T.M., Kiefer, R.W. and Chipman, J.W., 2015. Remote Sensing and Image Interpretation, John Wiley & Sons, Hoboken.

Longley, P. A., Goodchild, M. F., Maguire, D. J., & Rhind, D. W. (2021). Geographic information science and systems (5th ed.). Wiley.

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de Smith, M. J., Goodchild, M. F., & Longley, P. A. (2023). Geospatial analysis: A comprehensive guide (7th ed.). Troubador Publishing.

Sullivan, L. M. (2021). Essentials of biostatistics in public health (4th ed.). Jones & Bartlett Learning.

Yeates, M., 1974. An Introduction to Quantitative Analysis in Human Geography, McGraw-Hill, New York.

GG. Ph.D. 007: Research and Publication Ethics

Credits 02

Modules	Unit Title	Teaching Hours
Theory		
RPE1	Philosophy and Ethics	4
RPE 2	Scientific Conduct	4
RPE 3	Publication Ethics	7
Practice		
RPE 4	Open Access Publishing	4
RPE 5	Publication Misconduct	4
RPE 6	Database and Research Metrics	7

Responsibility: Research Center shall conduct the UGC approved 02 credits course as per UGC letter No. D.O.F. 1-1/2018 (Journal/CARE) Dated Dec. 2019 and SPPU circular No. 65/2020 dated 3rd March 2020

OR

Research Scholar can complete the Research and Publication ethics course run by the Centre of Publication Ethics SPPU.

References:

Resnik, D. B. (2020). *The ethics of science: An introduction* (2nd ed.). Routledge.

Steneck, N. H. (2022). *Introduction to the responsible conduct of research* (Revised ed.). U.S. Government Printing Office.

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Suber, P. (2021). *Open access* (Updated ed.). MIT Press.

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Gasparyan, A. Y., Nurmashev, B., Yessirkepov, M., Endovitskiy, D. A., & Kitas, G. D. (2021). *Plagiarism in scientific writing: Causes, consequences and prevention*. Journal of Korean Medical Science, 36(4), e44. https://doi.org/10.3346/jkms.2021.36.e44

Wilsdon, J., Bar-Ilan, J., Frodeman, R., Lex, E., Peters, I., & Wouters, P. (2020). *Next-generation metrics: Responsible metrics and evaluation for open science*. European Commission Report.

Bornmann, L., & Marx, W. (2022). *The h-index and its variants: A bibliometric overview*. SpringerBriefs in Scientometrics and Research Evaluation.

GG. Ph.D. 008: Pedagogical Training/Industrial Visit Report/Field Work/Assessment Statement

Credits 01

Hours: 30

Responsibility: Research Center & Research Supervisor

Award of Credits for Ph. D. Course Work

Table -1: Percentage to grade and grade point

Sr. No.	Grade Letter	Grade Point	Marks
1	O Outstanding	10	90 to 100
2	A+ (Excellent)	9	80 to 89
3	A (Very Good)	8	75 to 79
4	B+ (Good)	7	70 to 74
5	B (Above Average)	6	65 to 69
6	C (Average)	5	60 to 64
7	D (Pass)	4	55 to 59
8	F (Fail)	0	<55
9	Ab (Absent)	0	

Table -2: Illustration of the Structure of CGPA and Marks Scheme for Ph. D. Course Work (Sample Copy)

Sr No	Course Code	Course Name	Credit	Internal marks	External marks	Grade Letter	Grade Point (0-10)	Credit Point = (Credit X Grade Point)
1	**RM**	Research Methodology	4	30	70	A	8	32
2	**SCW**	Seminar/Conference/ workshop	1	-	-	O	10	10
3	**SPAL-1**	Subject Specific Advanced Level Course-1	4	30	70	O	10	40
4	**SPAL-2**	Subject Specific Advanced Level Course-2	4	30	70	A+	9	36
5	**RPE**	Research and Publication Ethics	2	15	35	B+	7	14
6	**PIA**	Pedagogical Training/ Industrial Visit report/Assessment Statement	1	07	18	A	8	8
Total			**16**	**112**	**263**		**52**	**140**

CGPA = Total Credit Point / Total Credit for The Course:
8.75 Final Grade: A+ Excellent
Result : Pass

Table No.3: CGPA Distribution and corresponding class of the degree awarded

Sr. No.	CGPA	Class of the Ph. D. course awarded
1	9.50 or More than 9.5	O Outstanding
2	8.25 or more but less than 9.50	A+ (Excellent)
3	6.75 or more but less than 8.25	A (Very Good)
4	5.75 or more but less than 6.75	B+ (Good)
5	5.25 or more but less than 5.75	B (Above Average)
6	4.75 or more but less than 5.25	C (Average)
7	4.00 or more but less than 4.75	D (Pass)