

P. G. Department of Geography

Syllabus - 2023

M. A./ M. Sc. in Geography **(Admission Session: 2023-24)**



Fakir Mohan University
Nuapadhi, Balasore – 756 089, Odisha

Syllabus of M. A./ M. Sc. in Geography (With effect from 2023-2025 batch)

COURSE STRUCTURE

Paper Code	Title	Paper Type	Credit Hours	Marks [Internal + End Term]
FIRST SEMESTER				
GG-101	Geomorphology	THEORY	4	100 [40+60]
GG-102	Bio Geography and Environmental Geography	THEORY	4	100 [40+60]
GG-103	Human and Economic Geography	THEORY	4	100 [40+60]
GG-104	Regional Geography: India and Odisha	THEORY	4	100 [40+60]
GG-105	Quantitative Geography (Practical)	PRACTICAL	8	100
SECOND SEMESTER				
GG-201	Climatology, Oceanography & Hydrology	THEORY	4	100 [40+60]
GG-202	Modern Geographical Thought	THEORY	4	100 [40+60]
GG-203	Population and Settlement Geography	THEORY	4	100 [40+60]
GG-204	Social, Cultural and Political Geography	THEORY	4	100 [40+60]
GG-205	Survey and Cartography (Practical)	PRACTICAL	8	100
THIRD SEMESTER				
GG-300	Fakir Mohan Studies	THEORY	0	Grade Only
GG-301	Research Methodology: Theory and practice	THEORY	4	100 [40+60]
GG-302 (A/ B/ C)	Special Paper I	THEORY	4	100 [40+60]
GG-303 (A/ B/ C)	Special Paper II	THEORY	4	100 [40+60]
GG-304 (CBCS)	Environmental Geography: Towards Sustainability	THEORY	4	100 [40+60]
GG-305	Computer Applications in Geography (Practical)	PRACTICAL	8	100
FOURTH SEMESTER				
GG-401	Dissertation: Proposal	PROJECT	4	100
GG-402	Dissertation: Data Work	PROJECT	4	100
GG-403	Dissertation: Findings Presentation	PROJECT	4	100
GG-404	Dissertation: Report	PROJECT	8	100
GG-405	Dissertation: Viva-Voce	PROJECT	4	100
Total			96	2000

SPECIALIZATION OFFERED

Specialization/ Special Paper	(A) Urban and Regional Planning	(B) Remote Sensing and GIS	(C) Population Geography
GG-302 (A/ B/ C)	Urban and Regional Development and Planning	Advanced Remote Sensing	Fertility, Mortality and Population Policies
GG-303 (A/ B/ C)	Development of Urban Communities and Planning	Geographic Information System and Earth Positioning System	Migration, Urbanization and Development

MARKING PATTERN

Distribution of Internal and End-term Marks:

Post-Graduate degrees offered by the University follow a continuous evaluation system as per the marks distribution mentioned below for each theory and practical paper. Besides, the dissertation work has been divided into five courses/ papers as specified in the course structure and each paper has to be evaluated by the concerned supervisor/ one or more examiners for awarding marks.

Paper Type	Distribution of Marks	Total Marks
Theory	Internal (40) + End term Examinations (60)	100
Practical	Seminar Presentation [#] (10) + Practical Record (10) + End term Examinations* (60) + Viva-Voce (20)	100

** Includes experiments; [#]: From regular seminar presentation*

Scheme of Internal Evaluation (Theory):

Each theory paper consists of five units and irrespective of the credit hours assigned, will be of 100 marks, out of which, 40 will be internal marks (continuous evaluation) and 60 will be end term examination marks. There will be three components of internal evaluation – Quiz, Mid Term Written Test and Home Assignment as per the details below.

Component	Unit(s)	Marks	Remarks
Quiz – I	I	10	Best of the two quizzes will be considered
Quiz – II	III	10	
Mid Term (Written)	I & II	20	There will be no internal evaluation for the last unit (V)
Home Assignment	IV	10	
Total	I – IV	40	Q – 10 + HA – 10 + W – 20

VALUE-ADDED/ ADD-ON COURSES

A student of M. A./ M. Sc. in Geography shall undertake one or more value-added courses of 2 – 4 credits each offered by the University and an online course of up to 4 credits under the MOOC platform, preferably during the 2nd/ 3rd semester, the performance of which may be reflected in the final grade sheet issued by the University or in a separate report card issued for the purpose by the competent authority. Fees towards enrollment and examination of such courses have to be borne by the concerned candidate.

SELF STUDY

25% of each unit of a theory paper is earmarked for self-study by students as per UGC directives. For completion of the portion in a particular semester, the course teacher is required to take one/ two introductory classes in the beginning, one/ two summarizing classes at the end and few doubt clearing classes in between, if required. Students are required to make presentation on selected topics from the self-study section during the class in order to assess their understanding of the subject and take remedial measures, if needed. The portion earmarked for self-study has been underlined in the syllabus.

PROGRAM OUTCOMES (POs)

Upon completion of the Master's Degree in Geography, apart from a general coverage of the fundamentals of geographic sub-disciplines, the course is geared to cater the following objectives:

PO1. Students will venture into the socio-spatio-temporal interactions of the physical, human and environmental components, which are often complex and dynamic.

PO2. Students will learn regional dimensions attached in socio-cultural, political, economic and physical characteristics at global, regional and local in a nested scale.

PO3. Students will be skilled in various disciplinary theories, methodologies, develop analytical skills and can establish the interrelationship between people and place, and society and nature.

PO4. Students will develop critical thinking and skills that promote leadership qualities individually as well as in a team.

PO5. Students will be ensured that the geographical knowledge are self-directed and lead to lifelong learning with a clear and effective communication ability.

PROGRAM SPECIFIC OUTCOMES (PSOs)

Programme specific Outcomes of the Master's Degree in Geography offered by Fakir Mohan University include:

PSO1. Develop an attitude, and acquire skills to work both as an individual and also in team in identifying problems and challenges, and give possible solutions.

PSO2. In the field surveys, students are exposed to a detailed understanding of socio-economic and cultural dimensions of the people with special focus on marginalized sections of the society, which shall enable them to understand the socio-cultural realities of the world.

PSO3. Students are trained in handling modern computer based technologies such as RS and GIS, which allows them to use various software such as QGIS (open source) and ArcGIS, and also several statistical packages such as STATA and SPSS, which can be instrumental in getting them into both public and private sector.

PSO4. Research enhancement courses shall develop the ability of the students to write dissertation and thesis, project work and reports and also make them able to examine socio-cultural-environmental issues and give possible solution.

PSO5. The syllabus is oriented towards emerging job opportunities and future prospects for the students, through which, the students can be guided to various competitive exams like NET-JRF, and Civil service exams.

FIRST SEMESTER

GG-101: Geomorphology

Learning Objectives: The objective of the course is to familiarize the students with the need for understanding of geomorphology with reference to certain fundamental concepts, focusing on the unity of geomorphology in the earth materials and the processes with or without an element of time.

Pre-Requisites: Knowledge of Physical geography, various geographic landforms

Teaching Scheme: Regular classroom lectures with use of ICT tools

Course Outcome: At the end of the course, the student is expected to

- i. Explain basic principles for development of landforms through time on the earth's surface.
- ii. Make an initial of geomorphological fieldwork.
- iii. Learn the techniques of geomorphological analysis

Unit I: Geomorphology: Concepts and Theories [12 Hours]

Meaning & Definition of Geomorphology; Fundamental principles of Geomorphology by Thornbury; Doctrine of Isostasy- concept of Airy and Pratt & Heiskanen; Mountain building Theories: Concepts of Kober, Holmes and Daly; Cycle of Erosion: Davis and Penk Models.

Unit II: Earth's interior and Earth movement [12 Hours]

Evolution of earth and earth's internal structure, composition and characteristics; Continental Drift Theory by Wegner, Plate tectonic; Earthquake and Volcanism: Seismology & Plutonism.

Unit III: Geomorphic Process and landforms [12 Hours]

Slope Development: Elements, Classification, Approaches and Models of Slope evolution (L. C. King and Wood); Concept and process of gradation: Weathering, Mass Wasting, Erosion; Geomorphic Landforms: Fluvial, Glacial, Aeolian, Marine and Karst.

Unit IV: Applied Geomorphology [12 Hours]

Concept and scope of Applied Geomorphology; Anthropogenic Geomorphology - Humans as Geomorphic Agents; Applied Geomorphology in Planning and Development; Applications of Remote Sensing and GIS techniques in Geomorphology.

Unit V: Application in Engineering and Hazard Management [12 Hours]

Applications of Geomorphology in Engineering Projects; Land form Occurrence and Causes of Geomorphic Hazard (Flood, Landslide, Avalanches, Subsidence, earthquake and volcanoes).

Suggested Readings:

- Bloom, A.L. (2003): Geomorphology: A Systematic Analysis of Late Cenozoic Landforms, Prentice Hall, Upper Saddle River, New Jersey
- Chorley, R.J. and Kennedy, B.A. (1971): Physical Geography: A Systems Approach, Prentice Hall, Upper Saddle River, New Jersey.
- Dayal P. (1995) A Text Book of Geomorphology 2nd Edition., Sukla Book/Dept. Patna.
- Huggett, R (2006): Fundamentals of Geomorphology, Routledge, London.
- Kale, V.S. and Gupta, A. (2001). Introduction to Geomorphology, Orient Longman Ltd., Hyderabad:
- Knighton, D. (1998): Fluvial Forms and Processes: A New Perspective, Arnold, London: 385p.
- Singh, Savindra (2011): Geomorphology, Prayag Pustak Publications, Allahabad.
- Strahler A. H and Strahler, A. N. (1992) : Modern Physical Geography, John Wiley, New York
- Thornbury, W.D. (1969): Principles of Geomorphology, Wiley Eastern Limited, New Delhi.

GG-102: Biogeography and Environmental Geography

Objectives: *The basic objective of the course is to familiarize the students about distribution of species, factors and basic principles, and to make them understand the concept of environment from different perspectives, besides sensitizing the learners about major environmental problems.*

Pre-requisites: *Basics awareness of biota and knowledge of environment and its components*

Teaching scheme: *Regular interactive face-to-face classroom teaching with use of ICT tools as per requirement supported by group projects and presentation by students.*

Course Outcomes: *in the successful completion of the course, student will be able to*

- i. *Critically evaluate the patterns of life forms and its correlates*
- ii. *Understand the environment from different perspectives and various ecological processes.*
- iii. *Recognize the values of biodiversity and other natural resources.*
- iv. *Comprehend major environmental problems and relevant management strategies.*
- v. *Get an idea about natural hazards and disasters and their management.*

Unit I: Basics of Biogeography [12 Hours]

Development of Biogeography: Special reference to Alexander von Humboldt; Alpha and Beta diversity; Dispersal Biogeographical Process: Agents, Forms and Routes; Vicariance Biogeography: Splitting of ancestral and widespread species distribution by Geological and Ecological factors; Biomes and Hotspots.

Unit II: Biogeographic Patterns and Dynamics [12 Hours]

Bio-geographical regions of the world; Insular Biotas: Island Biogeography; Ecosystem fragmentation; Domestication and agricultural origins, Biogeography of Human Infectious Disease; Anthropocene and dynamics.

Unit III: Understanding the Ecosystem and Environment [12 Hours]

Concept of Environmental Geography; Ecosystem: Definition, Types, Structure and Components; Concepts of Food Chain, Food Web, Ecological Pyramid, Energy Flow and Biogeochemical Cycles - Carbon, Nitrogen and Oxygen cycles; Biodiversity: Definition, Level, Values and Conservation; Natural Resources: Concept and Types.

Unit IV: Environmental Degradation [12 Hours]

Concept and Types of Environmental Pollution and Pollutants; Status of Environmental Pollution in India with focus on Air Pollution and its effect on Health in Delhi NCR; Major Environmental Problems - Global Warming, Ozone Depletion, Acid Rain and Desertification

Unit V: Disaster and its Management [12 Hours]

Environmental Hazards and Disasters: Concept and Types; Difference between Hazard and Disaster; Approaches of studying disasters; Vulnerability, Risk and Capacity Analysis in Disaster; Disaster Management: Concept, Objectives, Approach, Goals and Importance; Disaster Management Cycle and its Major Stages.

Suggested Readings:

- Ackerly, D.D., Loarie, S.R., Cornwell, W.K., Weiss, S.B., Hamilton, H., Branciforte, R. and Kraft, N.J.B., 2010. The geography of climate change: implications for conservation biogeography. *Diversity and Distributions*, 16 (3): 476-487.
- Castree, N., Demeritt, D., Liverman, D., & Rhoads, B. (Eds.). (2013). *A Companion to Environmental Geography*. Wiley-Blackwell.

- English, P. W., & Mayfield, R. C. (Eds.). (1972). *Man, Space and Environment: Concepts in Contemporary Human Geography*. Oxford Univ Press.
- Fitzpatrick, B.M., Fordyce, J.A. and Gavrillets, S., (2009). Pattern, process and geographic modes of speciation. *Journal of evolutionary biology*, 22(11), pp.2342-2347.
- Goel, P. K., & Kumar, A. (2001). *Industry Environment and Pollution*. ABD Publishers, Jaipur.
- Goudie, A. (2018). *The Human Impact on the Natural Environment – Past, Present and Future*. Wiley-Blackwell.
- Jorge V. Crisci et al. (2009). Darwin, historical biogeography, and the importance of overcoming binary opposites. *Journal of Biogeography* 36: 1027-1032.
- Lomolino, M.V. et al. (2004). Foundations of Biogeography.
- Mark V. Lomolino. (2001). Ecology's most general, yet protean pattern: the species-area relationship. *Journal of Biogeography* 27: 17-26.
- Mittermeier, R. A., Will R. Turner, Frank W. Larsen, Thomas M. Brooks, and Claude Gascon. (2011). Global biodiversity conservation: the critical role of hotspots. *Biodiversity Hotspots*: 3-22.
- Moseley, W. G., Perramond, P., Hapke, H. M., & Laris, P. (2014). *An Introduction to Human-Environment Geography: Local Dynamics and Global Processes*. Wiley-Blackwell.
- Rana, S. V. S. (2013). *Essentials of Ecology and Environmental Science* (5th ed.). PHI Learning.
- Richardson, D.M. and Whittaker, R.J., 2010. Conservation biogeography—foundations, concepts and challenges. *Diversity and Distributions*, 16 (3): 313-320.
- Rizwan, S. A., Nongkynrih, B., & Gupta, S. K. (2013). Air pollution in Delhi: Its Magnitude and Effects on Health. *Indian Journal of Community Medicine*, 38(1): 4–8.
- Saxena, H. M. (2017). *Environmental Geography* (3rd ed.). Rawat Publications.
- Singh, S. (2010). *Environmental Geography*. Prayag Pustak Bhawan, Allahbad.

GG-103 Human and Economic Geography

Objectives: *the course has two major objectives-*

- to expose the foundations, basic approaches and theories of human geography
- to provide an overview of spatial and structural dimension of economic activities

Pre-requisites: *aware of human geography and basic knowledge on economic activities*

Teaching scheme: *class room lectures, guided readings, students-led discussions of books and research papers and assignments. The department may arrange field local visits to familiarize human diversity and differences including different dimensions of economic systems and activities.*

Course outcomes: *in the successful completion of the course, student will able to critically articulate the concepts, approaches and its applications in human geography. Besides, the learner will also get insights into major economic systems, global changes and consequences*

Unit I: Theory, Models and Explanations in Human Geography [12 Hours]

Need of Scientific Methods in Human Geography: Attempts to Become Science; Development of Theory in Human Geography: (i) Use of Ideographic and Nomothetic Approaches, and (ii) Use of Inductive and Deductive Approach; Models in Human Geography: Iconic, Analog and Symbolic Models.

Unit II: Geographic Diversity, and Differences [12 Hours]

Properties of Spatial Distribution of Features: Density, Concentration and Patterns; Distance: Absolute and Relative; Places: Unique Locations; Regions: Unique Areas; Geographic Branches of Religions; Preserving Endangered Languages: Special References to Odisha.

Unit III: Agricultural Systems [12 Hours]

Factors affecting spatial organization of economic activities (Primary, Secondary, Tertiary, Quaternary, Quinary). Agricultural Systems of the World; Cropping Patterns, Crop Association, Crop Diversification; Von Thunen's models of Agricultural Land Use.

Unit IV: Industrial Systems [12 Hours]

Theories of Industrial locations: Weber and Losch; Tourism Industry; Distribution and Growth of Information and Communication Technology (ICT) in India: Hi-tech City and Silicon Valley; Knowledge Production Industries: Research and Development.

Unit V: Global Changes and Consequences [12 Hours]

Perspectives on Globalization and Liberalization on Manufacturing Sectors in Less Developed Countries: Impacts of MNCs on Host Regions; Development Strategies in India; Development: Human and Economic dimensions; Sustainable Agricultural Development in Less Developed Worlds; Recent Rise of Informal Sectors in the Tribal Areas of Eastern India: Geographies of *Khadans* and associated activities.

Suggested Readings:

- Alexander J.W. (1974) Economic Geography, Printice Hall, New Jersey.
- Chorley, R. J. and P. Haggett. (1967). Socio-Economic Models in Geography. London: Methuen & Co Ltd.
- D. Kaur. (2016). Cropping pattern and agricultural productivity. In Economic Geography, Vol. 1, eds H.S. Sharam and M.H. Qureshi. New Delhi: Oxford University Press.
- Danny Mackinnon and Andrew Cumbers. 2015. Introduction to Economic Geography. Routledge.
- David Dorrell and Joseph P. Henderson. (2018). Introduction to Human Geography. University of System of Georgia. University of North Georgia, University Press, Blue Ridge.
- Goh Cheng Leong and G.C. Morgan. (1982). Human and Economic geography. Oxford university press, Oxford Ox2 6DP.
- H.M. Saxena, (2013). Economic geography. Rawat, Jaipur.
- Husain, M. (2004). Human geography. Jaipur, Rawat Publication.
- J. Singh and S.S. Dhillon. (1994). Agricultural geography. New Delhi: Tata McGraw-Hill Publishing Company Limited.
- James M. Rubenstein. (2010). Contemporary Human geography. PHI Learning Private Limited, New Delhi.
- James M. Rubenstein. (2010). Contemporary Human geography. PHI Learning Private Limited, New Delhi.
- Knowles, R and J. Wareing. (1976). Economic and social geography. Rupa Publications India Pvt Ltd, New Delhi.
- Knowles, R and J. Wareing. (1976). Economic and social geography. Rupa Pub. India Pvt Ltd.
- Neil M. Coe, P.F. Kelley, W.C. Henry and Yeung. (2019). Economic Geography- A Contemporary Introduction Wiley-Blackwell, UK.
- Steven Graves. (2017). Introduction to Human Geography: A Disciplinary Approach. Department of Geography. 2nd Edition. California State University, Northridge.
- Stuart C. Aitken. And Gill Valentine. (2014). Approaches to Human Geography: Philosophies, Theories, People and Practices. Sage Publishing.

GG-104: Regional Geography: India and Odisha

Objectives: to introduce India as a geographical entity- its physical diversity, people, resources and contemporary issues with special reference to Odisha.

Pre-requisites: basic understandings of 'unity in diversity' with special reference to India.

Teaching scheme: classroom lectures, seminar presentations and participation in group discussions. The course expects thoughtful and respectful engagement from co-learners to bring out new ideas and observations for collaborative learnings.

Course outcome: in the successful completion of the course, student will able to comprehend regional personalities of India and dynamics shaping its regions. Besides, students should understand role regional settings and processes that operate at varying rates and scales across the state creates spatial variations/diversity/disparity at regional level.

Unit I: Physical Basis of India

[12 Hours]

Geological Basis of India: Distribution Major Rock Systems; Physiographic Divisions of India: Geomorphic Characteristics; Himalayan and Peninsular Drainage Systems: Evolution and Orientation; Factors Influencing Indian Climate; Mechanism of Indian Monsoon; Climatic Regions of India: Trewartha's Climatic Regions

Unit II: Peopling in India

[12 Hours]

Trans-Continental Migration and Routes of Early Incursion into India; Geographical Features/Factors Behind India's History and Culture; Size of India's Population; Growth, Distribution and Density: A Regional Approach; Population Composition: Racial, Age, Sex, Linguistic.

Unit III: Resources, Economy and Environment

[12 Hours]

Ground Water Provinces (R. L. Singh); Fisheries: Fresh and Marine; Ferrous and Non-Ferrous Mineral Belts; Agricultural Regions of India; State of Land Degradation and Desertification in India; Evergreen Revolution: Prospects and Challenges of National and Local Levels.

Unit IV: Physical Setting of Odisha

[12 Hours]

Odisha: A Geographical Entity; Geological Structure: Distribution of Major Rock Systems; Physiographic Divisions: Coastal Plains, Central Tableland, Northern Plateau and Rolling Uplands; Factors Influencing Climate of Odisha and Climatic Regions; Development Induced Environmental Degradation in Odisha: Identifying Regions Specific Problems.

Unit V: People, Economy and Disaster Resilience in Odisha

[12 Hours]

Growth, Distribution and Density of Population; Population Composition: Linguistic, Rural-Urban; Cottage and Handicraft Industries of Odisha; Paradigm Shifts in Disaster Management: Success Stories of Odisha; Coastal Resilience to Hazards and Coping Strategies in Odisha.

Suggested Readings:

- Ahmad, A. (1990). Social geography. Jaipur: Rawat publication.
- Behera, J.K. and G.K. Panda. (2020). Vulnerability Analysis of Cyclone Hazards and the Changing Dimensions of Disaster Risk management in Odisha along the East Coast of India. International Journal of Recent Scientific Research 11 (08): 39445-39453.
- Butola, B.S. (Eds.) (2016). Agrarian Relations in India. In Economic Geography, Vol. 1. H.S. Sharama and M.H. Qureshi. Oxford University Press.
- Deshpande, C.D. (1992). India- A Regional Interpretation. ICSSR and Northern Book Centre.

- Duncan, J.M. (2017). Resilience to hazards: rice farmings in the Mahanadi Delta, India. Ecology and Society 22 (4): 3. <https://doi.org/10.5751/ES-09559-220403>
- Khullar D.R. (2011). India a comprehensive geography. Kalyan Publication.
- O'Malley, L.S. S. (2017). Provincial Geographies of India: Bengal, Bihar, Odisha and Sikkim. Eds. T. H. Holland. Cambridge University Press, New York.
- Pati, M. (1992). West Orissa: A study in Ethos. Sambalpur University Publication, Sambalpur.
- R.L. Singh. (2016). India: A regional geography. National Geographical Society of India, Varanasi.
- Ray, G.C. (2005). Geography of Odisha. Kitab Mahal, Cuttack-753003.
- Sharma, H.S. (2016). Land Resources. In Economic Geography, Vol. 1, eds H.S. Sharam and M.H. Qureshi. Oxford University Press.
- Singh, R.L. (2016). India: A regional geography. National Geographical Society of India, Varanasi.
- Sinha, B. N. (1971). Geography of Odisha. National Book Trust, New Delhi.
- Spate, O.H.K. and A.T. Learnmonth. (1968). India- A General and Regional Geography. Methuen.
- Sterling, Andrew and James Peggs. (1846). Orissa. John Snow, London.
- ଆଦିକନ୍ଧ ସାହୁ. (2003). ସମ୍ବଲପୁର: ଭାଷା, ସାହିତ୍ୟ, ସଂସ୍କୃତି. ସମ୍ବଲପୁର ବିଶ୍ୱବିଦ୍ୟାଳୟ ପ୍ରକାଶନ, ସମ୍ବଲପୁର.
- ଆଶୁତୋଷ ପ୍ରସାଦ ପଟ୍ଟନାୟକ. (2017). ଆକା ମା ବୋଲ: ସାମ୍ବୁଦ୍ଧିକ ବାଣିଜ୍ୟ ଓ ସାଂସ୍କୃତିକ ବିବର୍ତ୍ତନ. ଫ୍ରେଣ୍ଡସ୍ ପବ୍ଲିଶରସ୍ କଟକ.

GG-105: Quantitative Geography (Practical)

Objectives: This course is designed to make the student learn different statistical techniques, their computation, interpretation and use in geographical studies.

Pre-requisite: Basic knowledge of data and fundamental mathematical operations

Teaching Scheme: Classroom teaching involving explanation of the basic theoretical aspects, followed by practical exercises separately designed for each statistical method/ concept. The laboratory classes will be based on both manual and computer-based calculations and informal data collection, if required.

Course Outcomes: At the end of the course, the student is expected to

- i. Have learnt important statistical skills and their applicability in Geography.
- ii. Be able to make a choice of appropriate statistical method for a particular analysis.
- iii. Carry out various statistical processes and interpret the results.

(A) Experiments

1. Graphical representation of Frequency Distribution: Histogram, Bar-diagram, Frequency Polygon, Ogive and Pie-chart
2. Measures of Central Tendency and its characteristics: Arithmetic Mean, Geometric Mean, Harmonic Mean, Median and Mode
3. Measures of Dispersion: Range, Quartile Deviation and Standard Deviation
4. Measures of Skewness and Kurtosis
5. Measures of Location: Quartile, Decile and Percentile.
6. Moving Average
7. Arithmetic and Exponential Growth Rates
8. Correlation Analysis - Pearson and Spearman Coefficients
9. Linear Regression Analysis
10. Non-Parametric Test (Chi-square Test and Man-Whitney U Test)

(B) Practical Record, Seminar and Viva-Voce (40%)

Suggested References:

- Cole, J. P., & King, C. A. M. (1968). *Quantitative Geography*. John Wiley
- Fotheringham, A. S., Brunson, C., & Charlton, M. (2000). *Quantitative Geography: Perspectives on Spatial Data Analysis*. Sage.
- Gupta, S. P. (2018). *Statistical Methods*. Sultan Chand & Sons
- Khan, M. Z. A. (1998). *Text Book of Practical Geography*. Concept Publishing Company, New Delhi
- Mahmood, A. (1999). *Statistical Methods in Geographical Studies*. Rajesh
- Matthews, J. A. (1981). *Quantitative and Statistical Approaches to Geography - A Practical Manual*. Pergamon
- Pillai, R. S. N., & Bhagavathi (2019): *Statistics: Theory and Practice*, Sultan Chand & Sons
- Saha, P., & Basu, P. (2013). *Advanced Practical Geography*. Books & Allied Ltd
- Sarkar, A. (2000). *Practical Geography: A Systematic Approach*. Orient Black Swan
- Singh, R. L., & Singh, R. P. B. (2014). *Elements of Practical Geography*. Kalyani Publishers

SECOND SEMESTER

GG-201: Climatology, Oceanography & Hydrology

Learning Objectives: The objectives of the course are to introduce students to the many facets of weather and Climate and its application in different fields of study. Also, this paper aims at making students understanding Hydrology and Oceanography.

Pre-Requisites: Knowledge of weather and climate, hydrology & Oceanography

Teaching Scheme: Weather and climatic charts be made available to the students to explain weather conditions. Detailed charts and maps showing oceanic relief, currents and circulation of oceanic water be used for teaching along with Audio Visual aids.

Subject Outcome: At the end of the course, the student is expected to

- i. Understand the dynamics of climate and related theories.
- ii. Understand the relation between climatology and other disciplines
- iii. Describe how components of the water cycle are influenced by human activities.
- iv. Extract information about the bottom relief of oceans at regional level (Bay of Bengal) and understand the marine resources and their economic significance.

Unit I: Climatology: Concepts of Weather and Climate [12 Hours]

Nature & Scope of Climatology and its Relationship with Meteorology; Fundamental Principles of Climatology; Composition and structure of Atmosphere; Insolation: Meaning and Definition, Mechanism of Solar Radiation, Distribution of Insolation; Climatic classification: Koppen & Thornthwaite.

Unit II: Atmospheric Circulation

Heat Budget of Earth and Atmosphere; Air Pressure and Atmospheric Circulation: Pressure Belts and Wind Circulation; Air-masses: Types and Characteristics; Upper Air Circulation; Cyclones and Anticyclones: Tropical and Temperate

Unit III: Applied Climatology [12 Hours]

Approaches and Techniques of Weather Forecasting: Short, Medium and Long Range; Climate and Agriculture: Agroclimatology – Water Budget and Crop Calendar; Climate and Settlements: Urban Climatology – Urban Heat Island; Climate and Health: Bioclimatology – Human Comfort and Health Aspects.

Unit IV: Hydrology [12 Hours]

Rock Properties Effecting Ground Water: Porosity and Permeability; Vertical Distribution of Ground Water; Zone of Aeration and Zone of Saturation; Geologic Formation as Aquifers; Types of Aquifers; Springs; Ground Water Table Fluctuations and Its Causative Factors, Environmental Impacts.

Unit V: Oceanography [12 Hours]

Definition and Meaning of Oceanography; Foundation of Modern Oceanography; Contribution of Oceanographers in the Subject; Post-War Oceanography, Modern Trends; Bottom Topography of Bay of Bengal: Characteristics and Evolution; Waves and Tides: Genetic Classification and Models of Formation; Marine Resource: Types, Extraction Methods and Economic Significance; Marine and Coastal Area Management Policies - EEZ, CRZ, ICZM

Suggested Readings:

- Ackerman, S.A. and Knox, J.A. (2012): *Meteorology: Understanding the Atmosphere*, Jones & Bartlett Learning, London
- Atkinson, B. W. (Ed.) (1981): *Dynamical Meteorology: An Introductory Selection*, Methuen, London
- Barry, R.G. and Chorley, R.J. (2003): *Atmosphere, Weather and Climate*, Routledge, London
- Byers, H. R. (1974): *General Meteorology*, McGraw-Hill Book Company, New York
- Chandrasekar, A. (2010): *Basics of Atmospheric Science*, PHI Learning Pvt. Ltd., New Delhi
- Critchfield, H. J. (2004) *General Climatology*; PrenticeHall of India Private Ltd., New Delhi, 4 th Edition
- Gupta L S (2000): *Jalvayu Vigyan, Hindi Madhyam Karyanvay Nidishalya*, Delhi Vishwa Vidhyalaya, Delhi
- Houghton, J. (2002): *Physics of Atmosphere*, Cambridge University Press, Cambridge
- McIlveen, R. (2010): *Fundamentals of Weather and Climate*, Oxford University Press, Oxford
- Rayner, J.N. (2001): *Dynamic Climatology - Basis in Mathematics and Physics*, Blackwell Publishers Ltd., Oxford
- Rohli, R.V. and Vega, A. J. (2012): *Climatology*, Jones & Bartlett Learning, London
- Singh, S (2009): *Climatology*, Prayag Pustak Bhawan, Allahabad
- Trewartha G. T. and Horne L. H., 1980: *An Introduction to Climate*, McGraw-Hill.
- Brooks, K.N., Ffolliott, P.F., Gregersen, H.M and DeBano, F.B. (2003). *Hydrology and the Management of Watersheds*, 3rd edition, WileyBlackwell, Chichester.
- Brutsaert, W. (2005): *Hydrology: An Introduction*, Cambridge University Press, Cambridge.
- Carter, R.W.G. (1988): *Coastal Environments: An Introduction to the Physical, Ecological and Cultural Systems of Coastlines*, Academic Press, London.
- Chow, V.T. (1988): *Applied Hydrology*, McGrawHill Education, New York.
- Dingman, S.L. (2002): *Physical Hydrology*, 2nd edition, Prentice Hall, Englewood Cliffs Garrison, T.S. (2015). *Oceanography: an invitation to marine science*. Massachusetts: Cengage Learning.
- Pethick, J.S. (1984). *An introduction to coastal geomorphology*. London: Department of Geography, University of Hull.
- Sharma, R.C., and Vatal, M. (1962). *Oceanography for geographers*. Allahabad: Chaitanya Publishing.
- Talley, L.D. (2011). *Descriptive physical oceanography: an introduction*. Massachusetts: Academic Press.

GG-202: Modern Geographical Thought

Objectives: *To expose the students with perspectives, philosophy and recent debates modern and contemporary geography*

Pre-requisites: *Understanding on the contributions of pre-modern geographers*

Teaching Scheme: *Power-point presentation and discussion-oriented teachings*

Course Outcomes:

- i. *Will motivate students to think geography critically*
- ii. *Spatial knowledge co-creation*
- iii. *Students will be able to depict the applications of modern geographical approaches*

Unit I: Geography, A Science

[12 Hours]

Geography's Genealogies and pre-modern geography: Contributions of Greeks, Romans, and Arabs; Pioneering Scientific Geographers: Humboldt, Ritter, Ratzel, EC Semple, Huntington.

Unit II: Geography in the 20th Century

[12 Hours]

Anarchist Thought in Geography- Contribution of Kropotkin; Development of Cultural School: Contribution of Carl Sauer; Development of regional school: Contribution of Richard Hartshorne; The Schaefer-Hartshorne Debate: from Regional Exceptionalism to Generalization and Theory.

Unit III: Dualisms and Paradigms [12 Hours]

Rise of Dualisms in Geography- Regional vs. Systematic, Physical vs. Human; Idiographic vs. Nomothetic Science; Subjectivity vs. Objectivity: Concept and Application; Quantitative Revolution; Paradigm Shift.

Unit IV: Positivist to Interpretivist [12 Hours]

Spatial Sciences: Growth, Achievement, Critics; Logical Positivism; Realism; Social Construction: Conceptual Understandings; Reflexivity: Concept and criticality.

Unit V: Critical Geographies [12 Hours]

Humanism; Radical Geography; Behavioral Geography; Modernism; Postmodern Geographies; Geography of Gender.

Suggested readings:

- Agnew, John A. and Livingstone, D. N. (2011). The Sage handbook of Geographical Knowledge. Sage.
Board, C et.al. (1970). Progress in Geography. Vol. 1-8. Edward Arnold.
Bunge, W. (1962). Theoretical Geography. The Royal University of Lund.
Chorley, R. J. and Haggett, P. (1967). Models in Geography. Methun.
Cresswell, Tim. (2012) Geographic Thought: A Critical Introduction. Wiley Blackwell.
Dikshit, R. D. (1994): The Art and Science of Geography. Prentice Hall India.
Dikshit, R. D. (2003). Geographical Thought -A Contextual History of Ideas. Prentice Hall India.
Freedman, Jane. (2001). Feminism. Rawat.
Gould, J. R. (1980). An Introduction to Behavioural Geography. Oxford.
Hartshorne, R. (1959). Perspectives on the Nature of Geography. Rand McNally.
Harvey, D. (1969). Explanations in Geography. Edward Arnold.
Harvey, D. (1989). The Condition of Post Modernity. Blackwell.
Holt-Jensen, A. (2001). Geography: History and Concept. Paul Chapman.
James, P. E. (1972). All Possible Worlds: A History of Geographical Ideas.
Johnston, R. J. (1988). The Future of Geography. Edward Arnold.
Kuhn, T. S. (1962). The Structure of Scientific Revolution.
Lefebvre, H. (1991): The Production of Space. Blackwell. (French Edition, 1974)
Peet, R. (1998). Modern Geographical Thought. Rawat.
Peet, R. and Thrift, N. (Eds.). (2002). New Models in Geography. Vol.2. Unwin Hyman.

GG-203: Population and Settlement Geography

Objectives: This course intends to impart the basic understandings of the human settlements and orient the students towards population geography as a specialized field of geographical analysis and introduce the learners about the importance and basic components of population analysis and various techniques and methods used in it.

Pre-requisite: Basic knowledge of human settlements and its environments, society and fundamental statistics.

Teaching Scheme: Regular interactive face-to-face classroom teaching with use of ICT tools as per requirement and numerical exercise for better explanation of important techniques. Besides class room teachings, occasional field visits may be arranged by the department to familiarize the dimensions of human settlements.

Course Outcomes: At the end of the course, the student is expected to

- i. Be able to critically evaluate the distribution, determinants and emerging patterns of human settlements
- ii. Know about the major sources of population data and current demographic scenario of the World and India.
- iii. Understand the importance of studying population distribution, fertility, mortality and migration and their basic measures.

Unit I: Population Composition and Data [12 Hours]

Development of Population Geography as a subject; Source of Population Data; Methods of Studying Population Composition and Distribution: Map (Choropleth Map, Dot Map, Line Map), Graphical (Age-Sex Pyramid, Lorenz Curve) and Statistical (Growth Rate, Density, Sex Ratio, Dependency Ratio, Percent Urban).

Unit II: Population Growth and Dynamics [12 Hours]

Components of Population Analysis; Fertility: Concepts, Determinants, Implications and Basic Measures; Mortality: Concepts, Determinants, Implications and Basic Measures; Migration: Concept, Types, Determinants and Consequences.

Unit III: Population Theories

Population Theories: Malthusian and Demographic Transition Theories; Population-Resource Linkages and Concepts of Over, Under and Optimum Population; Population Policies in India with special reference to National Population Policy (NPP) 2000.

Unit IV: Settlement Geography and Rural Settlement [12 Hours]

Development of Settlement Geography; Classification of Settlements: (i) Dispersed and Nucleated (Finch & Triwartha's Scheme), (ii) Rural, Rural-Urban Fringe, Suburban, Peri-urban and Urban; Rural Settlements: Types, Patterns and Distribution; Contemporary Problems of Rural Settlements – Rural urban migration, Land use changes, Land acquisition and Transactions

Unit V: Urban Settlement [12 Hours]

Theory of Origin of Towns: Gordon Childe, Henri Pirenne, Lewies Mumford; Classification of Urban Settlements; Urban Systems: The Law of Primate City and Rank Size Rule; Models of Internal Structure of the City: Burgess, Hoyt, Harris and Ullman; Concepts of Megacities, Global Cities and Edge Cities.

Suggested Readings:

- Bhende, A., & Kanitkar, T. (2011). *Principles of Population Studies* (21st ed.). Himalaya Publishing House Pvt. Ltd.
- Chandana, R. C. (2009). *Geography of Population: Concepts Determinants & Patterns* (8th ed.). Kalyani Publishers.
- Clarke, G. I. (1987). *Population Geography* (2nd ed.). Pergamon Press.
- Dorrell, D., Henderson, J., Lindley, T. & Connor, G. (Eds.) (2019). *Introduction to Human Geography* (2nd ed.). Geological Sciences and Geography Open Textbooks.
- Ghosh, B. N. (1987). *Fundamentals of Population Geography*. Sterling Publishers Pvt Ltd.
- Ghosh, Sumita. (1998). *Settlement Geography*, Orient Longman, Hyderabad.
- Hassan, M. I. (2020). *Population Geography: A Systematic Exposition*. Routledge India.
- Hudson, F.S. (1970). *A Geography of Settlements*, Macdonald and Evans Ltd.
- Rubenstein, J. M. (2010). *Contemporary Human geography*. PHI Learning Private Limited, New Delhi.
- Kirk H. Stone. (1965). The Development of a Focus for the Geography of Settlement. *Economic Geography*. 41 (4): 346-355.
- Knowles, R and J. Wareing. (1976). *Economic and social geography*. Rupa Publications India Pvt Ltd, New Delhi.
- Pathak, K. B., & Ram, F. (2013). *Techniques of Demographic Analysis*. Himalaya Publishing House Pvt. Ltd.
- Singh R. L., Singh Kashi N., Singh, Rana P. B. (1975). *Readings in Rural Settlement Geography*, National Geographical Society of India,
- Singh, R.Y. (2003). *Geography of Settlements*, Rawat, Jaipur.
- Srinivasan, K. (1997). *Basic Demographic Techniques and Applications*. Sage Publications.

GG-204: Social, Cultural and Political Geography

Objective: To introduce the role of socio-cultural factors fostering spatial patterns that inherited in socio-cultural life and relations; with special reference to Indian context as well as to make the student understand the basics of political geography.

Prerequisite: Basic exposures to human geography/ any social sciences

Teaching Scheme: Regular classroom lectures with use of ICT tools as and when required.

Course Outcomes: The course will be sensitized students on social, cultural and political dimensions of life and the course will also orient students to carryout socially relevant research and endeavors in further studies and trajectories respectively.

Unit I: Themes in Social Geography [12 Hours]

Nature and Development of Social Geography: The Anglo-American School; Social Structure; Social Process; Social Segregation; Social Justice; Social Wellbeing.

Unit II: Towards the Social Geography of India [12 Hours]

Geographical Bases of Social Formations; Tribal Social Formation: Indian Context; Spatial Distribution of Social Group (Tribe); Social Differentiation and Region Formation: Evidences from *Sodasa Mahajanapadas*.

Unit III: Themes in Cultural Geography [12 Hours]

Concept of Culture and Cultural Traits; Iceberg Model of Culture: Edward T. Hall's Analogy of Invisible values and Visible actions; Diffusion of Culture: Geographical Aspects; Concept of Culture Areas; Cultural Regions: Formal, Functional, and Vernacular; Concept of Cultural Ecology and Cultural Convergence; Cultural Heritage: Concept, Types and Contemporary Concerns.

Unit IV: Geographic Patterns of Culture [12 Hours]

Classifying Language: Language Families, Language Branch and Language Group; Dialect: A Regional Variation of a Language; Multilingual States and Lingua Franca; Religion: Ethnic Religions and Universalizing Religions; Origin and Diffusion of Folk Culture and Popular Culture.

Unit V: Political Geography [12 Hours]

Development of Political Geography; Basic Elements of Political Geography: Territory, Population, Governance; Boundaries and Frontiers with special reference to India; Geopolitics: Theories of Heartland and Rimland; Regional Organizations of Cooperation (SAARC, ASEAN); Geopolitical Significance of the Indian Ocean; Geography of Voting: Electoral Reforms in India; Geographic Influences on Voting Pattern: Electoral Behaviour; Neopolitics of World Natural Resources.

Suggested readings:

- Adhikari, S. (1997). Political Geography, Rawat.
Agnew, J. (Eds.). (1997). Political Geography: A Reader. Arnold.
Ahmad, A. (1999). Social Geography, Rawat, Jaipur,
Dikshit, R.D. (1999). Political Geography-A Century of Progress. Sage.
Eyles, John (1979). An Introduction to Social Geography, Oxford, OUP.
Harvey, David. (1978). Social Justice and the City, Edward, London.

- Jackson P. and Smith S.J. (1986). Exploring Social Geography, George Allen and Unwin.
- Jackson, R. H. & Loyd E. Hudman. (1990). Cultural Geography-People, Places and Environment West.
- Joe Anderson. (2009). Understanding Cultural Geography, Places and Traces, Routledge, New York.
- Johnston R.J. et al. (1981). Dictionary of Human Geography Blackwell, New York.
- Jones, Emrys (ed). (1995). Readings in Social Geography, Oxford, London.
- Jordan, and Rowntree, L: The Human Mosaic. (1979). A Thematic Introduction to Cultural Geography, Harper Collins Publishers, New York.
- Pacione, M. (Eds.). (1985). Progress in Political Geography. Routledge.
- Patricia L Price, Tim Oakes (Eds). (2008). The Cultural Geography Reader, Routledge, New York.
- Slowe, P. (1990). Geography and Political Power. Routledge.
- Sopher, D.E. (1980). Exploration of India: Geographical Perspectives on Society and Culture, Longman, London.
- Spencer J.E. and Thomas, William L. (1969). Cultural Geography, John Wiley & Sons, New York.
- Srinivas, M.N. (1986). India: Social Structure, Hindustan, Delhi.
- Subba Rao: Personality of India. (1958). Pre and Proto Historic Foundation of India and Pakistan, M.S. University Baroda, Vadodara.
- Thapar, Romila. (1997). A History of India, Vol. 1, Penguin, Hammonds worth.
- Wagner, P.L. and Mikesell, M.W. (eds) (1962). Readings in Cultural Geography, Chicago.

GG-205: Survey and Cartography (Practical)

Objective: To impart training on the art and science of primary data collection and map making inculcating interpretational skills and techniques

Pre-requisite: Basic awareness/information/interest on maps, field disciplines, lessons on respecting biological and cultural diversity

Teaching Scheme: Hands on survey equipment, conducting field visit and enumeration, training on the use of different cartographic tools and equipment in the cartographic laboratory;

Course Outcomes: On completion of the course, students will able to:

- i. Understand the rationales of map projection, types and properties
- ii. Acquire the skills to draw map projections, thematic maps and graphs, including applications
- iii. Learn the cartographic techniques for graphical presentation of data
- iv. Integrate analytical skills to interpret physical and social attributes from toposheets
- v. Learn the scope, limitation and prospect of primary data collection
- vi. Skill up with field techniques for identification and acquisition of primary data

(A) Fundamentals of Map and Toposheet

1. Map: Definition, Types and Use
2. Presentation of Map Scales: Statement Scale, Ratio Scale, Graphical Scale, Vernier Scale.
3. Morphometric analysis of river basins
4. Analysis of social attributes

(B) Land use Survey

1. Plain table
2. Dumpy level
3. Prismatic compass
4. Identification of Geographical Features

(C) Socio-Economic Survey

1. Focus Group Discussion
2. Face to face interview: person-administered survey
3. Participant observation

(D) Map projection

1. Bonne projection
2. Mercator projection
3. Gnomonic projection

(E) Thematic maps

1. Isopleth and Choropleth
2. Chorochromatic
3. Choroschematic
4. Flow map

(F) Graphs

1. Climograph
2. Hythergraph
3. Ergograph

(G) Practical Record, Seminar and Viva-Voce (40%)

Suggested Readings:

- Hammond, R. and McCullagh, P.S. (1987): Quantitative techniques in Geography: An Introduction, OPU Oxford
- Kothari, C.R.: Research Methodology. (2004). Methods and Techniques, New Age, New Delhi.
- Krishnan, G. and Singh, Nina. (2017). Researching Geography, Routledge, London,
- Kumar, Ranjit: Research Methodology. (2011). A step-by-step guide for beginners, Sage, New Delhi.
- Mishra R.P. Ramesh. A (2000): Fundamentals of Cartography. Concept Publishing Company, New Delhi
- Robinson, A.H., et al. (2009): Elements of Cartography. 6th edn. John Wiley & Son, New York.
- Robinson, A.H., et. Al. (2009): Elements of Cartography. 6th edn. John Wiley & Son, New York.
- Saha, P. and Basu, P. (2013): Advanced Practical Geography. Book & allied Ltd. Kolkata.
- Sarkar, A. (1997): Practical Geography: A Systematic Approach, Orient BlackSwan Ltd. Hyderabad.
- Singh. R.L and Singh. R.P.B. (2010). Elements of Practical Geography. Kalyani Pub. New Delhi.
- Sjoberg, Gideon and Nett, Roger. (2009): methodology for social research. Rawat, New Delhi,

THIRD SEMESTER

CBCS, SPECIALIZATIONS AND FAKIR MOHAN STUDIES

In the third semester, each student has to opt for one paper offered by other regular P. G. departments of the University, under the Choice Based Credit System (CBCS)/ Inter Disciplinary Elective Paper and one of the three specializations offered by the Department. Each specialization shall comprise of two Theory Papers of 4 credits, carrying 100 marks each. Besides, a student has to take the compulsory non-credit course on *Fakir Mohan Studies* as a part of the programme.

Specializations offered:

- (A) Urban and Regional Planning
- (B) Remote Sensing and GIS
- (C) Population Geography

GG-300: Fakir Mohan Studies (Non-Credit Course)

The syllabus of the paper has been framed by the P. G. Department of Language and Literature, which will be shared before commencement of the classes.

GG-301: Research Methodology: Theory and Practice

Objectives: To introduce meaningful and professional research- logical and rational explanations, and processes of research writings

Pre-Requisites: Students need to have knowledge on logic of inquiry, take part in dialoguing; and identifying and resolving a problem

Teaching Scheme: Interactive classroom teaching, small field visits, and learning report writing

Course Outcomes:

- i. *connecting theories with research*
- ii. *students will be able to understand the impact of researcher and subject on each step of the research process*
- iii. *ethics is the most integral feature of the research design*
- iv. *students will be able to learn critical analysis of scholarly literature for effective report writing*

Unit I: Introducing Research and Methodology [12 Hours]

Nature and Characteristics of Geographic Research; Perspectives of Geographic Research; Spatial Thinking and Geographic Questions; Research: A way of thinking; Research Issues and Significance of Research;

Unit II: Research Ontology [12 Hours]

Research Methods vs. Methodology; Research Processes; Structure of Research Writing; Research Scale: Unit of Analysis; Research Ethics; Plagiarism.

Unit III: Research Design [12 Hours]

Research Design: Concept and Types; Defining Research Problem; Review of Literature; Conduct Background Research; Research Questions; Research Objectives; Hypothesis Testing; Choice of Indicators.

Unit IV: Logic of Enquiry [12 Hours]
Quantitative Methods: Sampling Design, Survey, Questionnaire/ Schedule; Qualitative Methods: Ethnography- Participant and Non-participant Observation; Focus Group Discussion; Interview Methods.

Unit V: Research Writing [12 Hours]
Data Analysis; Data Interpretation; Editing, Classification and Tabulation; Prepare a Research Proposal; Writing a Research Report; References and Bibliography; Annexure and Appendix; Methods of Communicating Research.

Suggested Readings:

- Amedeo, D. (1971). An Introduction to Scientific Reasoning in Geography. John Wiley.
Bunge, W. (1962). Theoretical Geography. Lund Studies in Geography. The Royal University of Lund.
Chorley, R.J. and Haggett, P. (1967). Models in Geography. Methuen.
Dawson, Catherine. (2002). Practical Research Methods: A user friendly guide to mastering research. Howtobooks.
Dikshit, R.D. (1994). The Art and Science of Geography. Prentice Hall India.
Harvey, D. (1969). Explanations in Geography. Edward Arnold.
Kothari, C.R. (2004). Research Methodology: Methods and Techniques. New Age.
Krishnan, G. and Singh, Nina. (2017). Researching Geography. Routledge.
Kumar, Ranjit. (2011). Research Methodology: A step-by-step guide for beginners. Sage.
Sjoberg, Gideon and Nett, Roger. (2009). A methodology for social research. Rawat.

GG-302 A: Urban and Regional Development and Planning

Objectives: To understand processes of urbanization, regional planning and development in urban India.

Pre-Requisites: The course requires conceptual understandings on region, planning and development processes

Teaching Scheme: Multimedia presentations and interactive classroom teachings, Students' led group discussions, urban data analysis and discussion.

Course Outcomes:

- i. Effective planning practice helps in regional development
- ii. Understanding contemporary planning practices
- iii. Human settlements highly relate to urban planning
- iv. Urbanization is a process and an opportunity
- v. Planning needs to be effective and efficient to make urban adequate
- vi. We intend to have inclusive, holistic and collaborative planning

Unit I: Concepts, History and Paradigm Shifts [12 Hours]
Regional Planning: Concept, Emergence and Contemporary Understandings; Emergence of Planning Professionals: Patrick Geddes and Le Corbusier; Niti Aayog: a think tank; North Eastern Region: North Eastern Council.

Unit II: Planning Techniques: Theories and Pioneer Thinkers [12 Hours]
Planning Research Methods; Planning Theories: Land Use Analysis; Growth Pole Theory; Growth Foci/ Centre Approach; Friedmann's Synthesis; The Cumulative Causation Theory.

Unit III: City-Region and Development**[12 Hours]**

Planning of City-Regions of India: NCR, Kolkata, and Mumbai Metropolitan Regions; Bhubaneswar Development Plan Area; Urban development schemes: Smart city; Amrut, Hriday and NULM.

Unit IV: Rise of Sub-urbanization**[12 Hours]**

Sub-Urbanization: A Process; Urban Growth and Suburban Sprawl: Complex Planning Practices; Emerging Socio-Economic Characteristics of the Suburb; Suburban Environment in Planning and Development; Land Conversions and its Regulation.

Unit V: Policy Implications and Development**[12 Hours]**

Regional Development Policy; Special Purpose Regions' Planning: KBK Regions; Planning for Backward Regions: Tribal Sub-Plan; Western Odisha Development Council; PURA: Decentralization and Inclusive Planning.

Suggested readings:

- Alan Lathan, Derek McCormack, Kim McNamara and Donald McNeill. (2009). Key concepts in urban geography. Sage.
- Bhatt, L.S. et. al. (Eds.). (1982). Regional Inequalities in India, Society for the study Regional Disparities.
- Chand, M and Puri, V.K. (1983). Regional Planning in India. Allied Publication.
- Chorley, RJ and Haggett, P. (1967). Models in Geography. Methuen.
- Christaller, W. (1966). Central Places in Southern Germany, (Tr) C.W. Baskin, Prentice Hall, Englewood Cliffs.
- Freire Mila and Richard Stren (Eds.). (2001). The challenge of urban government: Policies and Practices. The World Bank Institute.
- Friedmann, J and William Alonso. (1967). Regional Development and Planning: a Reader. MIT Press.
- Gottdiener Mark and Leslie Budd. (2005). Key Concepts in Urban Studies. Sage.
- Hall Tim. (2001). Urban geography. Routledge.
- Mehrotra Santosh. (2020). Planning in the 20th Century and Beyond: India's Planning Commission and the NITI Aayog.
- Mishra R P. (2002). Regional Planning: Concepts, Techniques, Policies and Case Studies. Concept Publishing Company.
- Misra R.P. et. al. (Eds.). (1974). Regional Development Planning in India. Vikas.
- Pacione, Michael. (2009). Urban Geography: A Global Perspective. Routledge.
- Peter De Souza. (2018). The Rural and Peripheral in Regional Development: An Alternative Perspective. Routledge.
- Peter, R. (2000). Urban Regeneration. University of Dundee. Sage.
- Prasad Sheela. (2016). Regional Development and Inequalities. In Economic Geography (Vol. 2) of Urbanization, Industry and Development, edited by L.S. Bhat and H. Ramachandaran and R. N. Vyas. Oxford.
- Randal Crane and Rachel Weber (Eds.). (2012). The oxford handbook of urban planning.
- Raza, Moonis. (1988). Regional Development, Heritage.
- S. K. Kulshrestha. (2012). Urban and Regional Planning in India: A Handbook for Professional Practice. Sage.
- Saskia S. (2000). Cities in a World Economy. University of Chicago, Sage.

GG-303A: Development of Urban Communities and Planning

Objectives: To explore the correlation between “urban community” and different dimensions of planning.

Pre-Requisites: Understandings on local, neighborhood, community living, planning and development

Teaching Scheme: Reading recent articles on Indian context and discussions besides classroom interaction

Course Outcomes:

- i. Revitalizing knowledge on community living in cities
- ii. Planning has always room for improvement, and often it must come from the community
- iii. Everyday realities of the community add experience-based expertise for the planned development

Unit I: Introduction to the Urban Community [12 Hours]

Urban Community: Concept, Relevance and Problems; Neighborhood Communities; New Urbanism; Community Well Being: Safety, Crime, Insecurity, Deprivation and Social Vulnerability, Gender Issues, The Elderly.

Unit II: Slums and Shanty Towns [14 Hours]

Theorizing Squatter Settlements and Slums; Social Problems of Slums; Urban Informality; The Illegal City: Space, Law and Gender; Urban Policies and Planning for Squatters and Slums; Dharavi: A Case for Transformation.

Unit III: Residential Segregation, Gentrification and the City [12 Hours]

Gated Communities: Ghettos for the Privileged; Housing Segregation; Gentrification without Segregation; Neighborhood, Gentrification and Exclusion; Planning Gentrification; Towards an Un-Gentrified Future.

Unit IV: Community Development and Urban Sustainability [12 Hours]

Rethinking the Concept of Community; Community Identity; Networking and Innovative Thinking; Everyday Urbanism; Community Experience in Urban Planning and Sustainable Development.

Unit V: Community Participation in Planning [12 Hours]

Participatory planning; Community and Sanitation; Solid Waste Management: Community Involvement in Collection, Disposal, Treatment and Reuse; The Future of Urban Communities: Inequality and Homelessness

Suggested Readings:

- Alan Lathan, Derek McCormack, Kim McNamara and Donald McNeill. (2009). Key concepts in urban geography. Sage.
- Gottdiener Mark and Leslie Budd. (2005). Key Concepts in Urban Studies. Sage.
- Karen, S. C. (1999). Cities and Complexity. University of California. Sage.
- Mohanty Monoranjan. Squatter Settlements and slums and sustainable development. Springer Nature Switzerland AG 2020. W. Leal et al. (eds.), Sustainable Cities and Communities, Encyclopedia of the UN Sustainable Development Goals, https://doi.org/10.1007/978-3-319-71061-7_49-1.
- Pacione Michael. (2009). Urban Geography: A Global Perspective. Routledge.
- Peter, R. (2000). Urban Regeneration. University of Dundee. Sage
- Randal Crane and Rachel Weber (Eds.). (2012). The oxford handbook of urban planning.
- Stein Samuel. (2019). Capital City: Gentrification and the real estate state. Verso.

GG-302 B: Advanced Remote Sensing

Learning Objectives: The objectives of the course include making an understanding of remote sensing and to equip the students with the skill of digital image processing and extraction of information from the satellite data.

Pre-requisites: Knowledge of satellites, image, electromagnetic spectrum, sensor,

Teaching Scheme: Classroom teaching with use of ICT tools, software

Course Outcomes: *Course Outcomes:* At the end of the course, the student is expected to

- i. Can perform basic operational skills necessary to acquire remote sensing data
- ii. Can able to extract geo-information from remote sensing data
- iii. Can carry out digital image processing and analyse remote sensing data

Unit I: Basics of Remote sensing [12 Hours]

Meaning and concept of Remote Sensing; History and Evolution of Remote Sensing; Remote Sensing Systems; Sources of energy, Energy radiation principle, EMR, EMS, Energy interaction in the atmosphere- scattering, Absorption and Atmospheric Windows, Energy interactions with earth surface feature- - reflection, absorption, emission and transmission, Spectral response pattern - vegetation, soil, water bodies. Advantages and limitation of Remote sensing.

Unit II: Satellite Remote sensing [12 Hours]

Orbital characteristics of Remote sensing satellite: Sun synchronous orbit and geostationary orbit; Concept of platforms and types; Concept of sensors and types; Resolution of sensors— spatial, spectral, radiometric and temporal, Different application with respect to earth surface feature, Remote sensing satellite in operation- LANDSAT, SPOT, IRS, INSAT, GEOSAT, IKONOS, QUICK BIRD, NOAA, TERRA.

Unit III: Digital Image Processing/ Enhancement/classification [12 Hours]

Digital Image: Concepts, characteristics and data format; Image Processing system- Hardware components, Software considerations; Stages in Digital image Processing- Image Rectification, Image Enhancement- Single Band Enhancement, Multiband Enhancement; Image Classification: Supervised and Unsupervised classification.

Unit IV: Thermal and Microwave Remote sensing and its application [12 Hours]

Basics of Thermal Radiation Principle, Black body principle, Data acquisition, types of scanner used in TRS, Thermal IR sensors, Application of Thermal Remote sensing, Microwave Remote sensing- meaning and concept, sensor, Radiometers, Microwave scattering (surface roughness, polarization, microwave wavelength, internal structure), RADAR operating Principle

Unit V: Hyper Spectral and LiDAR Remote sensing and application [12 Hours]

Introduction, The Imaging Spectrometer, Spectral Reflectance, Mineral Spectra , Plant Spectra Spectral Libraries, ASTER Spectral Library, USGS Spectral Library, Hyperspectral Sensors , Image Analysis ,Match Each Image Spectrum, Spectral Matching Methods , Linear Unmixing, Applications of Hyperspectral Remote Sensing, Geological Applications, Detection of water quality, Flood detection and monitoring, Land use and vegetation classification, Agriculture Surveillance, Chemical Imaging , Environment

Suggested Readings:

- Andrew, Milman S. (1999). *Mathematical Principles of Remote Sensing making Inferences from Noisy Data*, Ann Arbor Press, Noida.
- Bernhardsen, Tor (2002). *Geographic Information Systems – An introduction*, John Wiley and Sons, Inc., New York.
- Burrough, P. A. (1986). *Principles of GIS for Land Resources Assessment*, Oxford: Science publications.
- Curran, Paul J. (1985). *Principles of Remote Sensing*, English Language Book Society, Longman.
- Gibson, Paul. J. and Power, Clare H. (2000). *Introductory Remote Sensing: Digital Image Processing and Applications*, Routledge, London.
- Gonzalez, Rafael C. and Woods, Richard E. (2007). *Digital Image Processing (3rd Edition)*, Prentice Hall.
- Jensen R. John (2006). *Remote Sensing of the Environment - An Earth Resource Perspective*, Pearson Education Pvt. Ltd., Delhi.
- Lillesand, Thomas M. and Kiefer, Ralph W. (1994). *Remote Sensing and Image Interpretation*, John Wiley and Sons Inc., New York.
- Lo, C. P. and Yeung, A. K.W. (2005). *Concepts and Techniques of Geographic Information Systems*, Prantice Hall of India.
- Maguire, David J., Goodchild, Micheal F and Rhind, David W. (1991). *Geographical Information Systems – Principles and Applications*, John, Wiley Sons. Inc., New York.
- Worboys, Micheal F. (1995). *GIS – A computing Perspective*, Taylor & Francis.
- Zhong- Ren Peng, Ming-Hsiang Tsou, (2003) *Internet GIS: Distributed, GeographicInformation Services for the Internet and Wireless Networks*, Wiley.

GG-303 B: Geographic Information System and Earth Positioning System

Learning Objectives: *The objectives of the course to identify the real world representations and fundamentals of GIS and to become aware of in depth information related to spatial referencing and positioning and data entry and preparation*

Pre-requisites: *Knowledge of computers & its components ,data types, earth coordinate system.*

Teaching Scheme: *Regular lecture using audio-visual tools, hands on exercises on GPS/ GIS software.*

Course Outcomes:

Can define GIS Systems, Spatial data and Geoinformation, Maps, Databases, Spatial databases and spatial analysis, geographic phenomena.

ecome aware of Reference surfaces for mapping, Coordinate Systems, Absolute, relative, network positioning.

Can compose maps.

Unit: I Introduction to GIS

[12 Hours]

GIS: Basic concepts, Definition and History; Components of GIS; Recent trends and applications of GIS; Data structure and formats, Spatial data models – Raster and vector, Data base design- editing and topology creation in GIS, Linkage between spatial and non-spatial data, Data inputting in GIS.

Unit: II Data Types, Data Models and Data Editing

[12 Hours]

Data Types; Spatial Data; Non-Spatial Data, Data Input; Existing GIS Data, Metadata; Conversion of Existing Data, Creating New Data, Data Models: Vector Data Model, Raster Data Model; Integration and Comparison of Vector and Raster Data Models. Spatial Data Editing-Topological Editing and Non-topological Editing; Other Editing Operations; Editing Using Topological Rules. Types of Digitizing Errors, Causes for Digitizing Errors;

Unit: III Geospatial Analysis**[12 Hours]**

Spatial Data: Definition, Analysis, Processes & Steps, Software and Tools, Geodatabase Model, Role of Databases in GIS, Creating, Editing and Managing, Classification scheme of Vector- Based and Raster- Based GIS Operation Raster- Based Techniques: Methods of reclassification, overlay analysis, Digital Terrain Analysis and Modeling- TIN and DEM, Surface representation and analysis, Slope and Aspect, Geographic Visualization Data Classification, Map Comparison.

Unit-IV Advanced GIS and Application**[12 Hours]**

GIS Modeling- Concepts and Principles of GIS Model, Types of GIS models, Modeling Process, Application of GIS Modeling; Web GIS-Concepts and Principles; Definition and History of Web GIS; Significance of Web GIS; Open Source GIS; Web Based Geo Portal, India Geoportal; State Geoportal and District Geoportal; Mobile GIS- Concepts, Characteristics of Mobile GIS, Benefits of Mobile GIS, Mobile Applications.

Unit-V Earth's Positioning System**[12 Hours]**

Introduction; History of Navigation and Positioning; Types of Earth's, Positioning System- NAVSTAR, GPS, GALILEO, GLONASS and GAGAN; GPS Components; GPS Errors and biases- GPS ephemeris errors; GPS Positioning Modes; Application of GPS- GPS in Natural Resource Management, Surveying and Mapping, Navigation, Crustal Mapping, Agriculture, Military Operations, Urban Utilities and Services. Differential Positioning System (DGPS): Components, Function and applications.

Suggested Readings:

- Albretcht, J. (2007): Key Concepts & Techniques in GIS, SAGE Publications Ltd., London
- Bhatta, B. (2011): Remote Sensing and GIS, 2ND edn. Oxford
- Campbell, J.B. et. Al. (2011): Introduction to Remote Sensing. 5th edn. Guilford Press.
- Fazal, S. (2008): GIS Basics, New Age International (P) Limited, Publishers, New Delhi
- Lillesand, Thomas M. et. al. (2017) Remote Sensing and Image Interpretation. Wiley India, New Delhi.
- Lo, C. P. and Yeung A. W.: Concepts and Techniques of Geographical Information Systems, Harvey, F. (2008): A Primer of GIS: Fundamental Geographic and Cartographic Concepts, The Guilford Press, New York
- Haywood, Ian, Cornelius, Sarah & Carver, Steve (any edition), 'An Introduction to Geographical Information Systems', Prentice Hall, Pearson Education, U.K
- Joseph, G and Jeganathan, C. (2018): Fundamentals of Remote Sensing 3rd Edn. Universities Press, India
- Nath Sandhu. (2015): An Introduction to Remote Sensing, Koross Press, London.
- Sabins, F.F. (2008): Remote Sensing: Principles and Interpretation, Waveland Press Inc., Illinois
- Sahu, K.C. (2007): Textbook of Remote Sensing and Geographical Information Systems, Atlantic Publishers, New Delhi
- Shekhar, S. and Xiong, H. (eds.) (2008): Encyclopaedia of GIS, Springer, New York
- Weng, Qihao (2010): – Remote Sensing and GIS Integration: Theories, Methods and Applications, McGraw Hill.

GG-302 C: Fertility, Mortality and Population Policies

Objectives: This course aims at introducing the learners about important components of population analysis including fertility, mortality, and exposes them about demographic data, community health and major policies related to population

Pre-requisite: Basic knowledge of population data and components of population change.

Teaching Scheme: Regular interactive face-to-face classroom teaching with use of ICT tools as per requirement and numerical exercise for better explanation of important techniques.

Course Outcomes: At the end of the course, the student is expected to

- i. Know about the major sources of population data in detail.
- ii. Be able to assess the quality of data and adjust them if needed.
- iii. Understand the importance and methods of population estimation and projection.
- iv. Determine the fertility theories and analyse various measures of fertility and mortality.
- v. Deliberate the basic concepts about epidemiological and public health.
- vi. Comprehend the need, importance and features of select population policies.

Unit I: Sources and Evaluation of Population Data [12 Hours]

Sources and Types of Population Data; Population Census: Salient Features, Uses and limitation; Vital Registration System; Sample Registration System (SRS); Major Large Scale Sample Surveys - NFHS, NSS; Types and Sources of Error in Demographic Data; Measurement of Errors: Whipple's Index, Myer's Index, United Nation Joint Score Method.

Unit II: Fertility Measures and Theories [12 Hours]

Importance of Studying Fertility; Period Measures of Fertility: CBR, ASFR, ASMFR, GFR and TFR; Standardized Birth Rates; Cohort Measures of Fertility Based on Birth Order and Parity Data; Measures of Reproduction; Theories of Fertility: Social Capillarity Theory, Theory of Diffusion and Cultural Lag, Theories of Leibenstein, Becker, Easterlin and UN Threshold Hypothesis.

Unit III: Mortality Studies [12 Hours]

Mortality: Basic concepts, Data Sources and Importance of Study; Basic Measures of Mortality: CDR, ASDR, IMR, Under-five mortality Rate, Neo-natal Mortality Rate and Maternal Mortality Rate (MMR); Factors affecting Infant Mortality - Mosley and Chen's Framework for Child Survival; Life Table: Concept, Assumptions, Types, Uses and Construction; Concept of Model Life Table.

Unit IV: Community Health and Population Projection [12 Hours]

Health Care of the Community: Concept, Levels, Elements and Principles of Health Care; Assessment of Health Status and Health Problems; Organizational Structure of Health Care Delivery System in India; Population Estimates and Projections: Concept and Need; Mathematical Method of Population Projection: Linear and Exponential Growth Methods; Component Method of Population Projection; Concepts of Doubling time, Stable and Stationary Population.

Unit V: Population Policy [12 Hours]

Population Policy: Definition, Indicators, Features and Need; Evolution of Family Welfare Programme in India; UN World Population Conferences: Bucharest (1974), Mexico (1984), Cairo (1994) Conferences, Alma Ata Declaration (1978); Important Policies of India: National Population Policy (NPP) 2000, National Health Policy (NHP), and National Rural Health Mission (NRHM 2005-12).

Suggested Readings:

- Bhende, A., & Kanitkar, T. (2011). Principles of Population Studies (21st ed.). Himalaya Publishing House Pvt. Ltd.
- Bongaarts, J., & Potter, R. G. (1983). Fertility, Biology and Behaviour: An Analysis of the Proximate Determinants. Academic Press.
- Bouge, D. J. (1969). Principles of Demography. John Wiley and Sons.
- Chandana, R. C. (2009). Geography of Population: Concepts Determinants & Patterns (8th ed.). Kalyani Publishers.
- Coale, A.J., and Demeny, P. (1967). Regional Model of Life Tables and stable Population, Princeton, Princeton University Press.
- Das Gupta, M., Chen, L. C., & Krishnan, T. N. (Eds.) (1996). Health, Poverty and Development in India. Oxford University Press.
- Government of India (1999). National Policy on Older Persons in India. Ministry of Social Justice.
- Government of India (2000). National Population Policy. Department of Health and Family Welfare.
- Government of India (2002). National Health Policy. Ministry of Health and Family Welfare.
- Government of India (2006). Population Projections for India and States, 2001-2026. Office of the Registrar General.
- Hassan, M. I. (2020). Population Geography: A Systematic Exposition. Routledge India.
- Mosley, W. H., & Chen, L. C. (1984). Analytical framework for the study of child survival in developing countries. Population and Development Review, 10 (Supplementary Copy).
- Palmore, James A, and Gardner, Rober W. (1983). Measuring Mortality, Fertility and Natural Increase: a Self-Teaching Guide to Elementary Measures. Honolulu: East-West Population Institute, East-West Center.
- Park, K. (2009). Text Book of Preventive and Social Medicine. Banarsidas Bhanot Publishers.
- Pathak, K. B., & Ram, F. (2013). Techniques of Demographic Analysis. Himalaya Pub. House Pvt. Ltd.
- Preston, S. H. (Ed.) (1982). Biological and Social Aspects of Mortality and the Length of Life. Ordina Editions, Liege.
- Rowland, D. T. (2006). Demographic Methods and Concepts. Oxford University Press.
- Shryock, H and J. Siegel. (1973). The methods and Materials of Demography. Washington, DC: US Government Printing Office.
- Srinivasan, K. (1997). Basic Demographic Techniques and Applications. Sage Publications.
- United Nations (1973). The Determinants and Consequences of Population Trends, Vol. I. Department of Economic and Social Affairs.

GG-303 C: Migration, Urbanization and Development

Objectives: This course proposes to develop an understanding of two major geo-demographic processes of the modern world – Migration and Urbanization, among the students and make them realize the population-development linkages.

Pre-requisite: Basic knowledge of population movement and economic activities.

Teaching Scheme: Regular interactive face-to-face classroom teaching with use of ICT tools as per requirement and numerical exercise for better explanation of important techniques.

Course Outcomes: At the end of the course, the student is expected to

- i. Understand the concepts, types, theories and measurement of migration.
- ii. Know the measures of urbanization and visualise the state of urbanization in India and its associated problems.
- iii. Comprehend the basic concepts, relevance of studying, important measures and common effects of development in the context of population.

Unit I: Migration - Concepts and Measures [12 Hours]

Concept of Mobility and Migration, Sources of Data and Types of Migration; Direct Estimation of Lifetime and Inter-Censal Migration From Census Data from Place of Birth, Duration of Residence and Place of Last Residence Data; Indirect Measures of Net Internal Migration: Vital Statistics Method, National Growth Rate Method, Census and Life Table Survival Ratio Methods.

Unit II: Internal and International Migration [12 Hours]

Internal Migration: Pattern and Characteristics with Special Focus on India; Determinants and Consequences of Internal Migration on Rural and Urban Areas; International Migration: Concept, Sources of Data, Determinants and Consequences; Concepts of Labour Migration, Brain Drain, Refugee and Illegal Migration.

Unit III: Migration Theories [12 Hours]

Migration Theories and Models: Ravenstein's Laws of Migration, Everett Lee's Theory of Migration, Zelinsky's Five Phase Model of Migration; Todaro's Model of Rural-Urban Migration, Lewis-Fei-Ranis Model and Cumulative Causation Theory.

Unit IV: Urbanization and Measures [12 Hours]

Urbanization: Concept, Importance of Study and Sources of Data; Components of Urban Population Growth; Kingsley Davis Model of Urbanization; Level and Tempo of Urbanization; City Population Distribution; Urbanization in India and its Spatial Pattern; Phenomena of Over-urbanization and Urban Primacy; Urbanization Related Problems in Developing Countries with focus on India.

Unit V: Population Development [12 Hours]

Need to Study Population in the Context of Development; Economic, Social and Health Indicators of Development; Refined Indicators of Development: Human Development Index (HDI), Physical Quality Of Life Index (PQLI), Human Poverty Index (HPI), Gender Related Development Index (GDI), Gender Empowerment Measure (GEM); Millennium Development Goals (MDG) and Sustainable Development Goals (SDG).

Suggested Readings:

- Bhende, A., & Kanitkar, T. (2011). Principles of Population Studies (21st ed.). Himalaya Publishing House Pvt. Ltd.
- Bose, A., & Bhatia, J. (1978). India's Urbanization: 1901-2001. Tata McGraw-Hill.
- Bouge, Donald Joseph (1969), Principles of Demography, John Wiley and Sons, New York.
- Chandana, R. C. (2009). Geography of Population: Concepts Determinants & Patterns (8th ed.). Kalyani Publishers.
- Coale A.J. and Hoover, E.M. (1958). Population Growth and Economic Development in Low Income countries, Princeton N. J.: Princeton University Press
- Cohen, R. (1996). Theories of Migration. The International Library of Studies on Migration.
- Desai, A. R., & Pillai, D. (Eds.). (1990). Slums and Urbanisation. Popular Prakashan.
- David E Bloom, David Canning, Jaypee Sevilla, (2003). The Demographic Dividend. Sanata Monica, CA: Rand Corporation. Chapter 2.
- Dorrell, D., Henderson, J., Lindley, T. & Connor, G. (Eds.) (2019). Introduction to Human Geography (2nd ed.). Geological Sciences and Geography Open Textbooks.
- Hassan, M. I. (2020). Population Geography: A Systematic Exposition. Routledge India.
- Hollis, C., & Srinivasan, T, N. (Eds.). (2002). Handbook of Development Economics, Vol 1. Elsevier.
- Kingsley, Davis, (1972). World Urbanization, 1950-70, Vol. II, Analysis of Trends, Relationship and Development, Population Monograph Series 4 and 9, University of California, Berkeley.
- Ramchandran, R. (1989). Urbanisation and Urban Systems in India. Oxford University Press.
- Srinivasan, K. (1997). Basic Demographic Techniques and Applications. Sage Publications.
- Todaro, Michael P.(1976). Internal Migration in Developing Countries, International Labour Office, Geneva.

- United Nations (2004). World Urbanization Prospects. United Nations.
- United Nations, (1979). "Trends and Characteristics of International Migration Since 1950" Demographic Studies No. 64, UN, New York.
- United Nations. (2003). Indicators for Monitoring the Millennium Development Goals: Definition, Rationale, Concepts and Sources. New York: United Nations.
- Yadava, K. N. S. (1989). Rural-Urban Migration in India: Determinants, Patterns and Consequences. Independent Publishing Company.

GG-304: Environmental Geography: Towards Sustainability (CBCS)

Objectives: This course intends to apprise the non-geography students of the University, on the concept of environment from a geographical perspective and to sensitize them about major domains of environmental geography.

Pre-requisite: Basic knowledge of environment and its components

Teaching Scheme: Regular interactive classroom teaching with use of ICT tools as per requirement.

Course Outcomes: At the end of the course, the student is expected to

- i. Understand the features of various spheres of earth and human-environment interface.
- ii. Comprehend major environmental challenges of the earth.
- iii. Understand the issues of environmental conservation, management and environmental legislation.

UNIT I: Basics Concepts [12 Hours]

Environmental Geography: Concept and Importance; Environment and Interactions among the spheres of the earth: Atmosphere, Hydrosphere, Lithosphere, Biosphere and Noosphere; Interdependency and interrelation between the components of Ecosystem: Abiotic & Biotic; Biogeographic Realms; Environmental risk and vulnerability.

UNIT II: Human-Environment Interface [12 Hours]

Human ecological adaptations: (i) Cold region- Eskimo, (ii) Hot region- Bushman, (iii) Mountain- Gujjars; Land use and land cover changes: Implication of human interferences; Ecosystem services: impacts of environmental degradation on indigenous communities; Climate resilient agriculture.

UNIT III: Environmental Challenges [12 Hours]

Climate change; Global warming and Sea level rise; Ozone depletion; Acid rain; Urban Heat Island; Depletion of Biodiversity; Desertification; Salinization; Extreme weather and climate events; Environment-induced displacement and rehabilitation problems.

UNIT IV: Conservation and Management [12 Hours]

Traditional knowledge for conservation; Environmental Movements in India; Urban forestry: ecological function of green belt; Importance of Bio fertilizers and Bio pesticides; Role of NGOs and pressure groups in environmental conservations.

UNIT V: Environmental Legislations and Management [12 Hours]

Salient features and objectives of selected environmental legislations in India: Coastal Zone Notification 2019; Plastic Waste Management Rule 2016; Participatory Forest Management: Joint Forest Management and Community Conserved Areas.

Suggested Readings:

- Barry, R. and Chorley, R. (2003). *Atmosphere, weather and climate* (eighth edition). London: Routledge.
- Benjamin, B., & Maes. J. (2017). *Mapping Ecosystem Services*. Pensoft Publishers. Sofia.
- Gartland, Lisa Mummery. (2008). *Heat Islands: Understanding and Mitigating Heat in Urban Areas*. Routledge.
- Government of India. (2016). Plastic Waste Management Rules, 2016. Ministry of Environment, Forest and Climate Change Notification, 18th March, 2016. The Gazette of India, Part II- Sec. 3(i).
- Government of India. (2019). Coastal Zone Notification 2019. Ministry of Environment, Forest and Climate Change Notification, 18th January, 2019. The Gazette of India: Extraordinary, Part II- Sec. 3(i).
- IGNOU. BEVAE – 181: Ability Enhancement Compulsory Course (AECC) on Environmental Studies. 296 pages.
- Miller, Robert W., Richard J. Hauer and Les P. Werner. (2015). *Urban Forestry: Planning and managing urban greenspaces* (third edition). Waveland Press.
- Nelson, M. K. and D. Shilling. (2018). *Traditional Ecological Knowledge: Learning from Indigenous Practices for Environmental Sustainability*. Cambridge University Press.
- Oki, T., Blyth, E. M., Berbery, E. H., and Alcaraz-Segura, D. (2013) Land Use and Land Cover Changes and Their Impacts on Hydroclimate, Ecosystems and Society, in: *Climate Science for Serving Society*, edited by: Asrar, G. R. and Hurrell, J. W., Springer Netherlands, 185–203.
- Philip B. Bedient, Wayne C. Huber, Baxter E. Vieux. (2012). *Hydrology and floodplain analysis* (5th Edition). Pearson.
- Saxena, N.C. (1997). *The Saga of Participatory Forest Management in India*. Center for International Forestry Research. Jakarta, Indonesia.
- Shah, M. (2016). *Urban Water Systems in India: A way forward*. Indian Council for Research on International Economic Relations.
- Sharma, P.D. (2009). *Ecology and Environment*. Rastogi publication.
- Shaw, R., & Krishnamurthy, R. R. (2009). *Disaster Management: Global Challenges and Local Solutions*. University Press and CRC Press.
- Singh, Savindra. (2015). *Environmental Geography*. Allahabad: Provalika Publications.
- Singh, L. R. (2018). *Fundamentals of Human Geography*. Allahabad: Sharda Pustak Bhaban.
- Terminski, B. (2012). *Environmentally-induced displacement. Theoretical frameworks and current challenges*. International Organization for Migration. Geneva.

GG-305: Computer Applications in Geography (Practical)

Objectives: *This course is focused on enhancing the ability of students in terms of use of computer and different software for various geographical analyses in the fields of Population, Urban Studies, Health, Regional Planning, Development, Remote Sensing and GIS etc.*

Pre-requisites: *Basic knowledge of computer and MS-Office*

Teaching Scheme: *The classes will be based on hands-on exercises on different dimensions of applied geography with the help of computer programmes like MS-Excel, Arc GIS, Q-GIS, SPSS, PSPP etc.*

Course Outcomes: *At the end of the course, the student is expected to carryout mapping and geo-statistical analyses using available packages and utilizes them in different areas of geographical research.*

(A) Microsoft Excel

1. Age-Sex Pyramid
2. Geographic Flow Map
3. Standard Distance (Dispersion of population)
4. Rank Size Rule and Primacy Index
5. Whipple's Index and Myer's Index

(B) SPSS/ PSPP (Open Source)

1. Creation of Data Frame
2. Frequency Distribution, Cross Tabulation and Chi Square
3. Recoding and Construction of Indices
4. Bivariate Correlation
5. Binary Logistic Regression

(C) Arc GIS/ QGIS (Open Source)

1. Using Google Earth Engine, Software Demonstration Creation
2. Georeferencing, Digitizing, Data capturing
3. Visual Image Interpretation, Digital Classification (Unsupervised & Supervised)
4. Adding Style to Data
5. Query and Retrieval Spatial Analysis
6. Map composition
7. Integration of Python in GIS

(D) Practical Record, Seminar and Viva-Voce (40%)

Suggested Readings:

- Chawla, D., & Sondhi, N. (2015). *Research Methodology: Concepts and Cases*. Vikas Publ. House.
- Dawre, A., & Dawre, R. K. (2019). *Introduction to Remote Sensing, GIS and its Applications*. Walnut Publication.
- Field, A. (2019). *Discovering Statistics using IBM SPSS Statistics*. SAGE Publications India Pvt Ltd.
- Graser, A. (2016). *Learning QGIS: Create great maps and perform geoprocessing tasks with ease* (3rd ed.). Packt Publishing Limited
- Halter, C. P. (2017). *The PSPP Guide: An Introduction to Statistical Analysis* (2nd ed.). Creative Minds.
- Hari Shankar, A., & Bhusan, B. (2016). *Statistics for Social Sciences (With SPSS Applications)* (2nd ed.). PHI Learning Private Limited.
- Law, M., & Collins, A. (2015). *Getting to Know Arc GIS* (4th ed.). Esri Press
- Pathak, K. B., & Ram, F. (2013). *Techniques of Demographic Analysis*. Himalaya Publishing House.
- Sarma, K. V. S. (2010). *Statistics Made Simple: Do it Yourself on PC* (2nd ed.). PHI Learning Pvt. Ltd.
- Siegel, J. S., & Swanson, D. A. (eds.) (2004). *The Methods and Materials of Demography*. Elsevier.
- Srinivasan, K. (1997). *Basic Demographic Techniques and Applications*. Sage Publications.
- Verbyla, D. L. (2010). *Practical GIS Analysis*. Taylor and Francis.

FOURTH SEMESTER

DISSERTATION

The entire fourth semester of the Post-Graduate programme is devoted to dissertation/ major project work with 24 credits. Each student of M. A./ M. Sc. in Geography has to successfully complete the dissertation work, preferably in a reputed institution/ organization outside the University under the joint guidance of a supervisor from the organization, where the student would be working and a faculty member from the Department. The dissertation paper has five components with scheme of evaluation as below.

Component/ Paper	Credit	Examiner/ Assessor	Maximum Marks
GG-401: Dissertation: Proposal	4	Faculty Members present during the presentation	100
GG-402: Dissertation: Data Work	4	Supervisor(s)	100
GG-403: Dissertation: Findings Presentation	4	Faculty Members present during the presentation	100
GG-404: Dissertation: Report	8	Internal and External Examiners	100
GG-405: Dissertation: Viva-Voce	4	Internal and External Examiners	100

Notable Changes:

1. Correction of typological errors in different papers
2. Inclusion of components on Google earth Engine and Python in the practical paper on Computer Applications in Geography (GG-305).
3. Minor Revision in the contents of few papers (Unit-V of GG-103: Economic Geography; Unit-III of GG-204: Social, Cultural and Political Geography)
4. Two new papers (courses) were introduced as listed below in the RS-GIS Specialization.
 - GG-302B: Advanced Remote Sensing
 - GG-303B: Geographic Information System and Earth Positioning System
5. Approximate Percentage of Change: 10%

Finalized and Approved by the Board of Studies of Geography in its 9th meeting held on 12.10.2023