Aliah University

Syllabus for
3- Year B.A. /B.Sc. (Hons.) in Geography
(Applicable from: Session 2019-2020)

Department of Geography
Aliah University
(Park Circus Campus)
17, Gora Chand Road, Kolkata – 700 014
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A. Programme Outcome:

The completion of under graduation programme in geography make students equipped with the followings and they:

1. Will develop a solid understanding of the concepts of “space," “place” and “region” and their importance in explaining world affairs.
2. Will acquire an understanding of and appreciation for the relationship between geography and culture.
3. Will acquire an understanding of and appreciation for the role that geography can play in community engagement.
4. Will develop the ethical aptitudes and dispositions necessary to acquire and hold leadership positions in industry, government, and professional organizations.
5. Will read, interpret, and generate maps and other geographic representations as well as extract, analyze, and present information from a spatial perspective.
6. Will understand through lectures but also local, regional, and/or international travel the interconnection between people and places and have a general comprehension of how variations in culture and personal experiences may affect our perception and management of places and regions.
7. Will have a general understanding of physical geographic processes, the global distribution of landforms and ecosystems, and the role of the physical environment on human populations.
8. Will have a good understanding of the climatic phenomenon, influencing factors and will recognize the climate change processes.
9. Will also learn how to check climate change to save the planet earth.
10. Will have a general understanding of cultural geographic processes, the global distribution of cultural mosaics, and the history and types of interaction between people within and among these mosaics.
11. Will have a general understanding of global human population patterns, factors influencing the distribution and mobility of human populations including settlement and economic activities and networks, and human impacts on the physical environment.

B. Programme Specific Outcome

1. Students will be able to think in spatial terms to explain what has occurred in the past as well as using geographic principles to understand the present and plan for the future.
2. Students will have a general understanding of how the physical environment, human societies, and local and global economic systems are integral to the principles of sustainable development.
3. Students will have a general understanding of the various theoretical and methodological approaches in both physical and human geography and be able to develop research questions and critically analyze both qualitative and quantitative data to answer those questions.
4. Students will be able to present completed research, including an explanation of methodology and scholarly discussion, both orally and in written form and, wherever possible, utilize cartographic tools and other visual formats.

Detailed Course Structure with Credit Distribution

Course Name	Course Type	Course Code	L	T	P	Course Credit	Semester Credit
Semester I	Ability Enhancement Compulsory Course – I	EVSUGAE01	3	1	0	4	22+4
	Core Course - I	GEOUGCC01	4	0	2	6	
	Core Course - II	GEOUGCC02	4	0	2	6	
	Generic Elective - I	GEOUGGE01	4	0	2	6	
	AU Compulsory Course – I	AISUGAU01	3	1	0	4	
Semester II	Ability Enhancement Compulsory Course – II	ENGUGAE02	3	1	0	4	22
	Core Course - III	GEOUGCC03	4	0	2	6	
	Core Course - IV	GEOUGCC04	4	0	2	6	
	Generic Elective - II	GEOUGGE02	4	0	2	6	
Semester III	Core Course - V	GEOUGCC05	4	0	2	6	28
	Core Course - VI	GEOUGCC06	4	0	2	6	
	Core Course - VII	GEOUGCC07	4	0	2	6	
	Skill Enhancement Course - I	GEOUGSE01	2	0	2	4	
	Generic Elective - III	GEOUGGE03	4	0	2	6	
Semester IV	Core Course - VIII	GEOUGCC08	4	0	2	6	28
	Core Course - IX	GEOUGCC09	4	0	2	6	
	Core Course - X	GEOUGCC10	4	0	2	6	
	Skill Enhancement Course - II	GEOUGSE02	2	0	2	4	
	Generic Elective - IV	GEOUGGE04	4	0	2	6	
Semester V	Core Course - XI	GEOUGCC11	4	0	2	6	24
	Core Course - XII	GEOUGCC12	4	0	2	6	
	Discipline Specific Elective – I (Opt any one)	GEOUGDS01	4	0	2	6	
		GEOUGDS02	4	0	2	6	
	Discipline Specific Elective – II (Opt any one)	GEOUGDS03	4	0	2	6	
		GEOUGDS04	4	0	2	6	
Semester VI	Core Course - XIII	GEOUGCC13	4	0	2	6	24
	Core Course - XIV	GEOUGCC14	4	0	2	6	
	Discipline Specific Elective – III (Opt any one)	GEOUGDS05	4	0	2	6	
		GEOUGDS06	4	0	2	6	
	Discipline Specific Elective – IV (Opt any one)	GEOUGDS07	4	0	2	6	
		GEOUGDS08	4	0	2	6	

Detailed Course Syllabus

Course Name: **Geotectonics and Geomorphology**
Course Code: **GEOUGCC01**
L+T+P: **4+0+2 per week**

Course Outcome:

By the time students complete this course they will be able to:

1. Understand the geological evolution of the earth and earth movements– diastrophic and catastrophic
2. Comprehend the basic theories on isostatic adjustment of the earth.
3. Develop a overview of the plate movements and their imprints
4. Grasp the fundamental concepts in geomorphology, basic geomorphic processes such as weathering, mass-wasting and erosion
5. Differentiate the cyclic and non-cyclic concepts on the landscape evolution and development.
6. Identify the selective samples of rocks and minerals by megascopic and microscopic methods
7. Identify and draw the simple geological structures on uncial, fold and fault and their landform expression
8. Extract and portray the basic aspects of relief and drainage character tics from survey of India topographical maps (1:50000)

Unit I: Geotectonics

1. Evolution of earth through geological time scale
2. Layered structure of the solid earth- formation and characteristics; Earth movements: diastrophic and catastrophic – folds and faults
3. Concept of Isostasy – Airy and Pratt; global isostatic adjustment
4. Plate Tectonics as a unified theory of Global Tectonics; Seismicity, vulcanicity and mountain building in the light of plate tectonics

Unit II: Geomorphology

1. Fundamental concepts in geomorphology
2. Weathering, mass wasting and resultant landforms
3. Development of landforms under Fluvial, Coastal, Glacial and Aeolian processes
4. Cyclic (Davis and Penck) and non-cyclic(Hack) concepts in geomorphology

Unit III: Geotectonics and Geomorphology (Practical)

1. Drawing of geological section from geological map and its interpretation- uniclinal, fold and fault
2. Megascopic identification of rock and mineral , (a) mineral samples: talc, mica, bauxite, calcite, chalcopyrite feldspar, galena, gypsum, hematite, magnetite, quartz; and (b)rock samples: granite, basalt, dolerite, limestone, shale, sandstone, conglomerate, slate, phyllite, schist, gneiss, quartzite, marble, laterite; Preparation of thin slide and Microscopic identification of rocks and mineral
3. Analysis of geomorphic forms and processes from survey of India topographical maps (1:50000) of plateau region: construction of relief profiles (superimposed, projected and composite). Delineation of drainage basin. Construction of relative relief map,

slope map (Wentworth's method), drainage density map, stream ordering (Strahler) and bifurcation ratio

4. Laboratory notebook and viva voice.

Text and Reference Books

- *Billings, M.P. 1971. Structural Geology, Pearson.*
- *Bloom, A.L. 1992: Geomorphology- Systematic Analysis, Prentice Hall India, New Delhi.*
- *Chorley, R.J., Schumm, S. A. and Sugden, D.E. 1984: Geomorphology, Methuen, London.*
- *Dayal, P. 1996: Textbook of Geomorphology, Shukla Book Depot, Patna.*
  Geomorphology, Longman, London
- *Kale, V. and Gupta, A. 2001: Introduction to Geomorphology, Orient Longman, Kolkata.*
- *Monkhouse F.J. and Wilkinson, H.R.: Maps and Diagrams: Their Compilation and Construction, B.I. Publications Private Limited, New Delhi, 1971*
- *Sarkar, A.: Practical Geography: A Systematic Approach, 2nd edition, Orient Longman Ltd., Hyderabad, 2009*
- *Selby, M. J. 1991: Earth's Changing Surface, Clarendon Press, London*
- *Sen, P.K. 1989. Geomorphological Analysis of Drainage Basin: An Introduction to Morphometric and Hydrological Parameters, University of Burdwan.*
- *Singh, R.L. and Singh, R.P.B.: Elements of Practical Geography, Kalyani Pub. New Delhi, 1991*
- *Singh. S 2004: Geomorphology, Prayag Pub. Allahabad*
- *Singh. S 2005: Physical Geography, Prayag Pub. Allahabad.*
- *Small, R.J. 1978: The Study of Landforms, Cambridge University Press, Cambridge*
- *Sorrell, C.A. Rocks and Minerals: A Guide to Field Identification, St. Martin's Press.*
- *Strahler, A.N. and Strahler, A.H. 1984: Elements of Physical Geography, John Wiley, New York.*
- *Summerfield, M.A. 1992: Global tectonics and Landforms*
- *Thornbury, W.D. 1954: Principles of Geomorphology, John Wiley, New York.*
- *Wooldridge, S.W. and Morgan, R.S. 1959: The Physical basis of Geography- An Outline of*

Course Name: **Cartographic Techniques**
Course Code: **GEOUGCC02**
L+T+P: **4+0+2 per week**

Course Outcome:

By the time students complete this course they will be able to:

1. Will learn fundamental concepts of cartography i.e. the technique of map making.
2. Learn to create base map along with integration, transformation and also enlargement and reduction of map.
3. Learn map science and art behind making maps.
4. Will learn many aspects of map design and map production.
5. Make policy makers better equipped with spatial information of location, availability and accessibility resources.
6. Select and correctly reference literature to equip them for project reports etc.
7. Make them employable for the contemporary job markets.
8. Develop to handle projects of their own from designing to implementation.

Unit I: Basics of Cartography

1. Maps: Components and classification
2. Coordinate systems: Polar and rectangular; Concept of generating globe; Grids: Angular and linear systems of measurement; Bearing: Magnetic and true, whole-circle and reduced
3. Concept of geoid and spheroid with special reference to Everest and WGS-84
4. Concept and application of scales: Plain, comparative, diagonal and Vernier

Unit II: Map Projection

1. Map projections: Classification, properties and uses; Concept and significance of UTM
2. Representation of data using dots and proportional circle
3. Representation of data using isopleth and choropleth
4. Survey of India topographical maps: Reference scheme of old and open series. Information on the margin of maps

Unit III: Cartographic Techniques (Practical)

1. Graphical construction of scales: Plain, comparative, diagonal and Vernier
2. Construction of projections: Polar Zenithal Stereographic, Simple Conic with one standard parallel, Bonne's, Cylindrical Equal Area, and Mercator's
3. Thematic maps: Proportional squares, pie diagrams with proportional circles, dots and spheres, Choropleth and isopleths maps
4. Viva-voce based on laboratory notebook

Text and Reference Books

- *Anson R. and Ormelling F. J., 1994: International Cartographic Association: Basic Cartographic Vol. Pregmen Press.*
- *Gupta K.K. and Tyagi, V. C., 1992: Working with Map, Survey of India, DST, New Delhi.*
- *Mishra R.P. and Ramesh, A., 1989: Fundamentals of Cartography, Concept, New Delhi.*
- *Monkhouse F. J. and Wilkinson H. R., 1973: Maps and Diagrams, Methuen, London.*
- *Pearson II, F. 1990. Map Projections: Theory and Applications, 2nd Ed, CRC Press.*

- *Rhind D. W. and Taylor D. R. F., (eds.), 1989: Cartography: Past, Present and Future, Elsevier,International Cartographic Association.*
- *Robinson A. H., 2009: Elements of Cartography, John Wiley and Sons, New York.*
- *Saha, P.K. and Basu, P. (2009): Advanced Practical Geography, Books and Allied (P) Ltd., Kolkata.*
- *Sarkar, A. (2015): Practical geography: A systematic approach. Orient Black Swan Private Ltd., New Delhi*
- *Singh R. L. and Singh R. P. B., 1999: Elements of Practical Geography, Kalyani Publishers.*
- *Steers J.A. (1974): An Introduction to the Study of Map Projections, Hodder Arnold.*

Course Name: **Human Geography**
Course Code: **GEOUGCC03**
L+T+P: **4+0+2 per week**

Course Outcome:

By the time students complete this course they will be able to:

1. Explain the nature, scope and recent trends of Human Geography along with different approaches to study human geography.
2. Understand the resource, landscape and environment, and their interrelationship.
3. Study the concept and classification of human race and ethnicity, caste and tribe.
4. Understand the cultural regions, languages and religions in world perspectives, society and cultural processes.
5. Study the concept and indicators of human development and sustainable development.
6. Study the growth and distribution of population and population composition.
7. Acquire the knowledge of Demographic Transition Theory (DTM).
8. Understand the population-resource relationship by Ackerman.
9. Study the site and situation; Types and patterns of rural settlements, Morphology and segregation of rural settlements with reference to Indian.
10. Understand the origin and growth of urban settlements; Classification of urban settlements, issues and challenges Third World Urbanization.
11. Measure the growth rate of population by Arithmetic and Geometric methods.
12. Prepare the adequate maps and various graphs to represent the population data.
13. Understand and measures of HDI, GDI, GEM and HPI and their inferences.
14. Apply and understand the data analysis techniques for rural and urban settlement.

Unit I: Introduction to Human Geography

1. Nature, scope and recent trends of Human Geography; Approaches to Human Geography: Resource, locational, landscape, environment
2. Concept and classification of race and ethnicity; Caste and Tribe
3. Society: Social groups and processes; Cultural regions: language and religion
4. Concept and indicators of Human Development; 'Limits to Growth' and Sustainable Development

Unit II: Demography and Ekistics

1. Population: Population Growth and Distribution; Population composition; Demographic Transition Theory
2. Population-Resource Relationship (Ackerman)
3. Site and situation; Types and patterns of rural settlements, Morphology and segregation of rural settlements (Indian context)
4. Origin and growth of urban settlements; Classification of urban settlements: Third World Urbanization: issues and challenges

Unit III: Human Geography (Practical)

1. Measuring growth rate of population (Arithmetic and Geometric); Population structure- age-sex pyramids
2. Construction of HDI, GDI, GEM and HPI
3. Dominant and distinctive function (Nelson's method), Functional classification of settlements (Ternary diagram)
4. Laboratory note book and viva voice

Text and Reference Books

- *Bergman, E.F (1995): Human Geography-Culture, Connections and Landscape, Prentice Hall, New Jersey*
- *Chisholm. (1975): Human Geography, Penguin Books, Hermondsworth.*
- *Daniel, P.A. and Hopkinson, M.F. (1989) The Geography of Settlement, Oliver & Boyd, London.*
- *Johnston R; Gregory D, Pratt G. et al. (2008) The Dictionary of Human Geography, Blackwell Publication.*
- *Jordan-Bychkov et al. (2006) The Human Mosaic: A Thematic Introduction to Cultural Geography. W. H. Freeman and Company, New York.*
- *Norton. W. (2001): Human Geography, 4th Edition Oxford University press, Oxford*
- *Pearce D. (1995): Tourism Today: A Geographical Analysis, 2nd Edition, Longman Scientific & Technical, London*
- *Pickering K. and Owen A. A. (1997): An Introduction to Global Environmental Issues, 2nd edition Rutledge, London.*
- *Raw, M. (1986): Understanding Human Geography: A Practical Approach, Bell and Hyman. London*
- *Rubenstein, J.M. (2002), The Cultural Landscape, 7th Edition, Prentice Hall, Englewood Cliffs*
- *Smith D M (1982): Human Geography: A Welfare Approach, Edward Arnold, London*

Course Name: **Cartograms, Thematic Mapping and Surveying**
Course Code: **GEOUGCC04**
L+T+P: **4+0+2 per week**

Course Outcome:

By the time students complete this course they will be able to:

1. Use different instruments to collect base level data for cartographic map production.
2. Learn map science and art behind making maps.
3. Will learn to design and produce thematic maps.
4. Make visualize space and place for users.
5. Make policy makers better equipped with location, availability and accessibility resources.
6. Work in a collaborative setting with experience of work in the field.
7. Select and correctly reference literature to equip them for writing research reports.
8. Make them employable for the contemporary job markets.
9. Develop to handle projects of their own from designing to implementation.

Unit I: Fundamentals of Surveying and Mapping

1. Surveying: Fundamental concepts and types
2. Historical development of surveying
3. Principles of land use survey
4. Classification (Cadastral, Toposheet and Thematic) and Types (based on scale) of maps; Map Design and layout

Unit II: Surveying by Instruments: Concepts and Use

1. Angular measurement**:** Open and closed traverse survey using a Prismatic Compass
2. Determination of Reduced Level for Profiling and Contouring with Dumpy Level
3. Measurement of angular distance along vertical and horizontal plane by Transit Theodolite
4. Principles of Chain survey; Preparation of map using plane table

Unit III: Thematic Mapping (Practical)

1. Traverse survey using prismatic compass
2. Profile survey using dumpy Level
3. Determination of height and distance with base accessible and inaccessible (same vertical plane) by Theodolite
4. Viva-voce based on laboratory notebook

Text and Reference Books

- *Cuff J. D. and Mattson M. T., 1982: Thematic Maps: Their Design and Production, Methuen Young Books Delhi.*
- *Dent B. D., Torguson J. S., and Holder T. W., 2008: Cartography: Thematic Map Design (6th Edition), Mc Graw-Hill Higher Education*
- *Gupta K. K. and Tyagi V. C., 1992: Working with Maps, Survey of India, DST, New Delhi.*
- *Kraak M.-J. and Ormeling F., 2003: Cartography: Visualization of Geo-Spatial Data, Prentice-Hall.*
- *Mishra R. P. and Ramesh A., 1989: Fundamentals of Cartography, Concept, New Delhi.*
- *Monkhouse F. J. and Wilkinson H. R., 1973: Maps and Diagrams, Methuen, London.*

- *Rhind D. W. and Taylor D. R. F., (eds.), 1989: Cartography: Past, Present and Future, Elsevier, International Cartographic Association.*
- *Robinson A. H., 2009: Elements of Cartography, John Wiley and Sons, New York.*
- *Saha, P.K. and Basu, P. (2009): Advanced Practical Geography, Books and Allied (P) Ltd., Kolkata.*
- *Sarkar, A. (2015) Practical geography: A systematic approach. Orient Black Swan Private Ltd., New*
- *Singh R. L. and Singh R. P. B., 1999: Elements of Practical Geography, Kalyani Publishers.*
- *Slocum T. A., Mcmaster R. B. and Kessler F. C., 2008: Thematic Cartography and Geovisualization (3rd Edition), Prentice Hall.*
- *Tyner J. A., 2010: Principles of Map Design, The Guilford Press.*

Course Name: **Climatology**
Course Code: **GEOUGCC05**
L+T+P: **4+0+2 per week**

Course Outcome:

By the time students complete this course they will be able to:

1. Understand the concept of climatology and meteorology.
2. Know the composition and structure of atmosphere.
3. Learn the forces and laws of air motion.
4. Understand the process of insolation, temperature distribution, inversion of temperature and heat budget of the atmosphere.
5. Know the basic concept of air mass and stability-instability of weather.
6. Comprehend the process of condensation and mechanism of atmospheric circulation.
7. Learn different climatic classifications and causes and consequences of climate change.
8. Develop hands on training on measurement of weather elements using instruments.
9. Interpret Daily Weather Maps Hythergraph, Climograph (G. Taylor)

Unit I: Climatology-I

1. Nature and scope of Climatology and its relation with Meteorology; Nature, composition and layering of the atmosphere
2. Air motion: Forces and laws
3. Insolation: Controlling factors, Heat budget of the atmosphere. Temperature: horizontal and vertical distribution. Inversion of temperature: types, causes and consequences.
4. Air mass: Typology, origin, characteristics and modification. Weather: Stability and instability, barotropic and baroclinic conditions

Unit II: Climatology-II

1. Condensation: Process and forms. Mechanism of precipitation: Bergeron-Findeisen theory, collision and coalescence
2. Circulation in the atmosphere: Planetary winds, jet streams, index cycle. Monsoon circulation and mechanism with reference to India; Tropical and mid-latitude cyclones
3. Climatic classification after Koppen, Thornthwaite, Trewartha
4. Overview of climate change: Causes, evidences and consequences

Unit III: Climatology (Practical)

1. Measurement of weather elements using instruments: Atmospheric temperature and pressure, humidity (relative), amount of rainfall, wind direction and speed
2. Interpretation of Indian Daily Weather Maps including station models
3. Construction and interpretation of Hythergraph, Climograph (G. Taylor)
4. Laboratory note book and viva voice.

Text and Reference Books

- *Ahrens, C.D. 2012. Essentials of Meteorology: An Invitation to the Atmosphere. 9th Ed, Cengage Learning.*
- *Barry, R.G, Chorley R.J. 2009. Atmosphere Weather and Climate. 9th Ed, Routledge.*
- *Critchfield, H. J. 1983. General Climatology. Prentice Hall India Ltd (2010 Reprint).*

- *Lal, D.S. 2012. Climatology. Sharda Pustak Bhawan.*
- *Lutgens, F.K., Tarbuck, E.J. 1998. The Atmosphere: An Introduction to Meteorology, 9th Ed, Prentice-Hall Inc.*
- *Monkhouse, F.J., Wilkinson, H.R. 1971. Maps and Diagrams: Their Compilation and Construction, 3rded (2017 reprint), Alphaneumera-Kolkata.*
- *Oliver, J.E., Hidore J.J. 2002. Climatology: An Atmospheric Science, Pearson Education India*
- *Sarkar, A. 2015. Practical Geography: A Systematic Approach, 3rd Ed, Orient Blackswan.*

Course Name: **Soil and Biogeography**
Course Code: **GEOUGCC06**
L+T+P: **4+0+2 per week**

Course Outcome:

By the time students complete this course they will be able to:

1. Understand conceptual framework of soil and bio geography.
2. Know properties, classification and factors of soil.
3. Learn causes consequences of soil degradation.
4. Understand structure and organization of ecosystem along with Ecological Pyramids, laws of Thermodynamics and ecological succession.
5. Learn different types of bio-geochemical cycles and their significances.
6. Understand concept, threat and conservation of Biodiversity with special reference to India and learn major biomes of the world.
7. Analyse soil texture with 'Feel' method and laboratory Particle size analysis.
8. Develop hands on training of determining Soil N, P, K, pH, OM with soil testing kits.
9. Measure biomass and biodiversity of a place.

Unit I: Soil Geography

1. Land and soil: Soil sciences-Pedology, Edaphology and Soil Geography; Soil as natural dynamic body
2. Soil Properties and classification: Texture, structure, moisture, bulk density, soil reaction, organic matter, cation exchange capacity; Macro and micro elements; Genetic classification of soil
3. Factors of Soil formation; Pedogenic Process: General (addition, loss, transformations, translocations); Processes of zonal soil formation:Laterisation, Podsolisation, Calcification
4. Soil erosion and degradation- Factors, mechanisms and management

Unit II: Biogeography

1. System approach in Biogeography and Ecology: Ecosystem structure and organization (Components, Trophic Structure, Food Chain and Food Web, Keystone Species), Ecological Pyramids: Energy and Biomass; Laws of Thermodynamics-energy flow in ecosystems-; Ecological succession from sere to climax stage
2. Bio-geochemical cycles (carbon dioxide and nitrogen) and significance
3. Biodiversity: Definition, types, threats and conservation with special reference to India
4. Major biomes of the world: tropical rain forest, hot desert and taiga

Unit III: Soil and Biogeography (Practical)

1. Soil texture analysis: 'Feel' method and laboratory Particle size analysis; Ternary plot for textural distribution
2. Collection of soil samples and Determination of Soil N, P, K, p^H, OM with soil testing kits; spatial variations of soil properties on map
3. Biomass estimation and biodiversity measurement
4. Laboratory note book and viva voice

Text and Reference Books

- *Biswas, T.D. and Mukherjee, S.K.: Textbook of Soil Science, Tata-McGraw-Hill, 1987*
- *Brady, N.C. and Weil, R.R.: The Nature and Properties of Soil, 11th edition, Longman, London, 1996*
- *Chapman J.L. and Reiss, M.J.: Ecology: Principles and Applications, Cambridge University Press, Cambridge, 1993*
- *Daji, J. A.: A textbook of soil science, Asia Pub. House, 1970*
- *Dash, M.C..Fundamentals of Ecology, 2nd Edition, Tata McGraw-Hill, New Delhi, 2001*
- *Foth, H.D.: Fundamentals of Soil Science, 8th edition, John Wiley and Sons, New York, 1990*
- *Kormondy, E.J.: Concepts of Ecology, 4th edition, Prentice-Hall, India, New Delhi, 1996*
- *Monkhouse, F.J., Wilkinson, H.R. 1971. Maps and Diagrams: Their Compilation and Construction, 3rd Ed (2017 reprint), Alphaneumera-Kolkata.*
- *Odum, E.P.: Ecology: A Bridge between Science and Society, Sinaur Associates Inc. Publishers, Sunderland, 1997*
- *Sharma. P.D.: Ecology and Environment, 7th edition, Rastogi Publications, Mirat, 1996*
- *USDA: United States Department of Agriculture. 2014. Soil Survey and Laboratory Methods Manual, Soil Survey Investigations Report No. 51.*
- *Walters,M., Scholes, R.J. (Eds.) 2017. The GEO Handbook on Biodiversity Observation Networks, Springer International Publishing.*
- *Xiao, M. 2009. Soil Testing Laboratory Manual, Bent Tree Press.*

Course Name: **Statistical Methods in Geography**
Course Code: **GEOUGCC07**
L+T+P: **4+0+2 per week**

Course Outcome:

By the time students complete this course they will be able to:

1. Learn the significance of statistics in geography.
2. Understand the classification, importance and use of data in geography.
3. Study the frequency distribution table and its graphical representation.
4. Understand the concept of sampling and designing and conducting a sample survey for data collation and data analysis.
5. Clear the facts about the probability, types of probability and applications and uses in different field of geography.
6. Measure of central tendencies and dispersion.
7. Understand the Product Movement Correlation, Rank Correlation and regression analysis and their application in various fields of Geography.
8. Study the time series analysis and its application in geographical study.

Unit I: Basic Statistics

1. Significance of statistical techniques in Geography, classification of data, scales of measurement
2. Preparation of frequency distribution table and its graphical representation
3. Population and sample; Sampling techniques and its application in Geographical study
4. Concept and use of Probability in spatial analysis

Unit II: Numerical Data Analysis

1. Measurement of central tendencies and dispersions: Quartiles, Deciles and Percentiles; Mean, Median and Mode; Absolute dispersions (Mean Deviation, Quartile Deviation and Standard Deviation) and relative dispersion (Coefficient of Variation)
2. Measurement of association of variables: Product Moment Correlation and Rank Correlation; Linear Regression
3. Trend analysis using time series
4. Application of set theory and Venn diagram in Geographical mosaic

Unit III: Statistical Methods in Geography (Practical)

1. Measurement of central tendencies and dispersions: Quartiles, Deciles and Percentiles; Mean, Median and Mode; Absolute dispersions (Mean Deviation, Quartile Deviation and Standard Deviation) and relative dispersion (Coefficient of Variation)
2. Product Moment Correlation, Rank Correlation, Linear regression (bi-variate)
3. Time Series Analysis
4. Laboratory note book and viva voice

Text and Reference Books

- *Berry B. J. L. and Marble D. F. (eds.):* Spatial Analysis – A Reader in Geography.
- *Ebdon, D. (1985):* Statistics in Geography: A Practical Approach, *John Wiley & Sons, New York.*
- *Harris, R. and Jarvis, C. (2011):* Statistics for Geography and Environmental Science, *Prentice Hall, London.*
- *Johnston, R.J. (1978):* Multivariate Statistical Analysis in Geography: A Primer on the General Linear Model, *Longman, Harlow.*
- *Khan, N. (1998):* Quantitative Methods in Geographical Research, *Concept Publishing Company, New Delhi.*
- *King L. S., 1969:* Statistical Analysis in Geography, *Prentice-Hall.*
- *Mahmood A., 1977:* Statistical Methods in Geographical Studies, *Concept.*
- *McGrew Jr., J.C., Lembo Jr., A.J., Monroe, C.B. 2014.* An Introduction to Statistical Problem Solving in Geography, *Waveland Press.*
- *Pal S. K., 1998: Statistics for Geoscientists, Tata McGraw Hill, New Delhi.*
- *Rogerson, P.A. (2010):* Statistical Methods for Geography: A Student's Guide, *SAGE Publications Ltd., London*
- *Sarkar, A. (2013):* Quantitative Geography: Techniques and Presentations, *Orient BlackSwan, New Delhi*
- *Sarkar, A. 2015.* Practical Geography: A Systematic Approach, *3rd Ed, Orient Blackswan*
- *Spiegel M. R.:* Statistics, *Schaum's Outline Series.*
- *Yeats M., 1974: An Introduction to Quantitative Analysis in Human Geography, McGraw Hill, New York.*

Course Name: **Regional Geography of India**
Course Code: **GEOUGCC08**
L+T+P: **4+0+2 per week**

Course Outcome:

By the time students complete this course they will be able to:

1. Acquire knowledge of physiographic setup and regional disparity of India including climate, soil, and vegetation.
2. Learn some regional accounts like Vale of Kashmir, Deccan Trap and Tarai-Duars region.
3. Understand social base of India including population growth, population distribution and structure also know distribution of race, language and tribes of India.
4. Know resource base of India including conventional, non-conventional and alternative source of energy.
5. Acquire knowledge of characteristics of Indian agriculture and problems and prospects of Indian industries.
6. Develop hands on training on preparation of monthly temperature and rainfall graphs of different physiographic regions of India and learn about Ombrothermic diagram
7. Learn Agriculture Regionalization through crop combination after Weaver, Crop Diversification after Herfindahl.
8. Measure levels of development with Weighted Composite Index.

Unit I: Physical Setup and Regional personality

1. Physiography and Drainage
2. Climate, Soil and Vegetation: Distribution and interrelationship; Agro-Climatic Regions
3. Regional Accounts of Vale of Kashmir, Deccan Trap and Tarai-Duars region
4. Physiographic and climatic regions of West Bengal

Unit II: Socio-Economic Bases

1. Population: Growth, distribution and structure; distribution of race, language and tribes
2. Conventional and non-conventional sources of energy; Alternative energy
3. Characteristics of Indian Agriculture; Prospects of Organic farming; Problems and prospects of Indian Agriculture with special reference to West Bengal,
4. Problems and prospects of Indian industries; Information technology; Industrial regions of West Bengal

Unit III: Geography of India (Practical)

1. Monthly temperature and rainfall graphs of some selected stations from different physiographic regions of India; Ombrothermic diagram
2. Agriculture Regionalization-Crop combination after Weaver; Crop Diversification after Herfindahl
3. Weighted Composite Index for measurement of levels of development
4. Lab Notebook and Viva-voce

Text and Reference Books

- *Agarwal, A. and Narain, S. (1991): Third Citizen's Report - State of India's Environment [SOE-3]: Floods, Floodplains and Environmental Myths, Centre for Science and Environment, New Delhi*
- *Bandyopadhyay, S., Kar, N.S., Das, S., Sen, J. 2014. River system and water resources of West Bengal: A Review. In: Vaidyanadhan, R. (Ed) Rejuvenation of Surface Water Resources of India: Potential, Problems and Prospects, Geological Society of India Special Publication.*
- *Bhushan, C., Hazra, M.Z. and Banerjee, S. (2007): Sixth Citizen's Report - State of India's Environment [SOE-6]: Rich Lands Poor People: Is 'Sustainable Mining Possible?, Centre for Science and Environment, New Delhi*
- *Deshpande, C.D. (1992): India: A Regional Interpretation, Northern Book Centre, New Delhi*
- *Dhara, M.K., Basu, S.K., Bandyopadhyay, R.K., Roy, B., Pal, A.K. (Eds.) 1999. Geology and Mineral Resources of the States of India, Part-1: West Bengal. Geological Survey of India Miscellaneous Publication.*
- *Ghurey, G.S. 1963. The Scheduled Tribes of India, 1980 reprint, Transaction Books.*
- *Husain, M. (2014): Geography of India, Tata McGraw-Hill Education, New Delhi*
- *Johnson, B.L.C. (Ed) 2001. Geographical Dictionary of India, Vision Books.*
- *Kale, V.S. (2014): Landscapes and Landforms of India, Springer*
- *Khullar, D.R. (2011): India: A Comprehensive Geography, Kalyani Publishers, New Delhi*
- *Krishnan, M.S. (1949): Geology of India and Burma, The Madras Law Journal Press, Chennai*
- *Mamoria, C.B. (1995): Economic and Commercial Geography of India, Shiv Lal Agarwal & Co., Agra*
- *Mandal, H., Mukherjee, S., Datta, A. 2002. India: An Illustrated Atlas of Tribal World, Anthropological Survey of India.*
- *Pal, S.K. (1998): Physical Geography of India, Sangam Books Ltd., New Delhi*
- *Pathak, C.R. 2003. Spatial Structure and Processes of Development in India, Regional Science Association-Kolkata.*
- *Sharma, T.C. 2012. Economic Geography of India, Rawat Publications.*
- *Singh, J. 2003. India-A Comprehensive & Systematic Geography, Gyanodaya Prakashan.*
- *Singh, J. and Dhillon, S.S. (2004): Agricultural Geography, Tata McGraw Hill Education, New Delhi*
- *Singh, R.L. (1993): India: A Regional Geography, UBS Publishers Distributors, New Delhi*
- *Singh, R.L. 1971. India: A Regional Geography, National Geographical Society of India.*
- *Spate, O.H.K., Learmonth, A.T.A. 1967. India and Pakistan: A General and Regional Geography, Methuen.*
- *Tiwari, R.C. 2007. Geography of India, Prayag Pustak Bhawan. New Delhi*
- *Valdiya, K.S. (2013): Environmental Geology: Indian Context, Tata McGraw-Hill, New Delhi*
- *Valdiya, K.S. 2010. The Making of India: Geodynamic Evolution, Macmillan Publishers India Ltd.*

Course Name: **Economic Geography**
Course Code: **GEOUGCC09**
L+T+P: **4+0+2 per week**

Course Outcome:

By the time students complete this course they will be able to:

1. Study the nature and scope economic geography along with different approaches to the study economic geography.
2. Understand the concept of resources, goods and services, production, exchange and consumption.
3. Make out the concept of economic man, theories of choices, economic distance and transport costs.
4. Know the technological changes and their geographical impacts on the society.
5. Study the concept and classification of economic activities.
6. Explain the locational models in economic geography namely Von Thünen, Weber and Losch and their present day applicability.
7. Explain the agricultural systems with case studies of tea plantation in India and mixed farming in Europe.
8. Study the Trans-Asian highways; International agreements and trade blocs i.e. GATT and OPEC.
9. Measure and illustration of inequality of economic data with the help of Lorenz curve and Gini Coefficient and Location Quotient
10. Understand the spatial variation in occupational structure by proportional divided circles and calculation of bid-rent after Von Thunen.
11. Understand the application of transport network analysis by detour index and shortest path analysis.

Unit I: Basic Concepts

1. Nature and Scope of Economic Geography, Approaches to the study of Economic Geography
2. Concepts in Economic Geography: Resources, Goods and services, production, exchange and consumption, New Economic geography
3. Concept of economic man, theories of choices, Economic distance and transport costs
4. Technological changes and their geographical impacts; Economic agglomeration

Unit II: Economic Activities

1. Concept and classification of economic activities
2. Locational models in Economic Geography- Von Thünen, Weber and Losch
3. Agricultural systems: Case studies of tea plantation in India and mixed farming in Europe
4. Trans-Asian highways; International agreements and trade blocs: GATT and OPEC

Unit III: Economic Geography (Practical)

1. Measurement and depiction of Inequality: Lorenz curve and Gini Coefficient; Location Quotient
2. Spatial variation in occupational structure by proportional divided circles; Calculation of bid-rent after Von Thunen
3. Transport network analysis by detour index and shortest path analysis.
4. Laboratory note book and viva voice

Text and Reference Books

- *Alexander J. W., 1963: Economic Geography, Prentice-Hall Inc., Englewood Cliffs, New Jersey.*
- *Aoyama, Y., Murphy, J., and Hanson, S. (2010) Key Concepts in Economic Geography, London: Sage.*
- *Bagchi-Sen S. and Smith H. L., 2006: Economic Geography: Past, Present and Future, Taylor and Francis.*
- *Berry, B.J.L., Conklin, E.C. and Ray, M.D. (1976):* The Geography of Economic Systems, *Prentice Hall, New Jersey.*
- *Bradford, M.G. and Kent, W.A. (1977):* Human Geography, Theories and Applications, *Oxford University Press, Oxford.*
- *Coe, N., Kelly, P., and Yeung, H. (2007)* Economic Geography: A Contemporary Introduction, *London: John Wiley & Sons.*
- *Fujita M., Krugman P. and Venebles A.J. (2001):* The Spatial Economy: Cities, Regions and International Trade. *MIT Press.*
- *Gautam, A.: Advanced Economic Geography, Sharda Pustak Bhawan, Allahabad, 2010*
- *Guha, J .L. and Chattoraj, P.R.: A New Approach to Economic Geography: A Study of Resources, 15th edition, World Press, Calcutta, 1998*
- *Hartshorne and Alexander: Economic Geography, 3rd edition, Prentice- Hall India Ltd., New Delhi, 1988*
- *Leong, G.C. and Morgan, G.C.: Human and Economic Geography, 2nd edition, Oxford University Press, Oxford, 1982*
- *Mamoria, C.B.: Economic and Commercial Geography of India, Revised edition, Shivalal Aggarwala and Co., Agra, 1996*
- *Mitra, A.: Geography of Resources, 2008*
- *Roy, P.: Economic Geography: A Study of Resources, New Central Book Agency (P), Ltd., Kolkata, 2009*
- *Siddhartha, K.: Approaches of Economic Geography, Kisalaya Publications Pvt. Ltd., New Delhi, 2009*

Course Name: **Remote Sensing and GIS**
Course Code: **GEOUGCC10**
L+T+P: **4+0+2 per week**

Course Outcome:

By the time students complete this course they will be able to:

1. Learn a basic understanding of concepts, science, and theory, behind remote sensing and GIS, including visualization of organization, management, and geospatial data.
2. Learn Digital image classification, correction, processing, GIS data base, Image enhancement, interpretation, and photogrammetric knowledge.
3. Familiar with ground, air, and satellite based sensor platforms.
4. Plot, map and interpret Earth science data and present the results in a designed and concise way.
5. Gain experience in the applications of remote sensing and GIS for solving problems in the physical and social science studies.
6. Gain experience in the use of Erdas (remote sensing), ArcGIS (GIS) and MapInfo software as the course is strongly computer-based.

Unit I: Remote Sensing

1. Principles of Remote Sensing, Properties of Electro-magnetic Radiation; Types of Resolution and Satellite Sensors: LANDSAT and Indian Remote Sensing series
2. False colour composite and its applications; Image Classification: Types, Principles and applications
3. Digital elevation data: sources and application (CartoDEM, SRTM, ASTER)
4. Principles of photogrammetry; Significance of 3-Dimension features; Scale of the aerial photo; types of aerial photographs, Photo interpretation keys and their applications

Unit II: GIS

1. Components of GIS, Major application areas of GIS
2. Types and properties of GIS data: Spatial and attribute, raster and vector
3. Major navigation systems (GPS, Galileo, Glonass, and IRNSS) - Constellation, and applications
4. Components and working principles of positing system; Integration of RS, GIS, and GPS data

Unit III: Remote Sensing and GIS (Practical

1. Pre-processing of image- image enhancement and atmospheric corrections. Preparation spectral library of different feature class based on IRS and LANDSAT data
2. Image classification – supervised and unsupervised and accuracy assessment
3. Geo-referencing, digitization and preparation of different thematic maps and diagrams based on data in attribute table; Preparation of buffer and overlay to portray the dynamics of the geo-spatial environment
4. Laboratory note book and viva Voice

Text and Reference Books

- *Bhatta, B. 2011. Remote Sensing and GIS, 2nd Ed, Oxford Univ. Press.*
- *Bolstad, P. 2016. GIS Fundamentals: A First Text on Geographic Information Systems, 5th Ed, Xan Edu Publishing.*
- *Jensen, J.R., 2013. Remote Sensing of the Environment: An Earth Resource Perspective, Pearson*
- *Joseph, G. and Jegannathan, C. 2018. Fundamentals of Remote Sensing, 3rd Ed, Universities Press.*
- *Lillesand, T.M., Kiefer, R.W., Chipman, J.W. 2015. Remote Sensing and Image Interpretation, 7th Ed, Wiley.*
- *Rampal, K.K., 1982, Text book of photogrammetry, Oxford & IBH: New Delhi.*

Course Name: **Regional Planning and Development**
Course Code: **GEOUGCC11**
L+T+P: **4+0+2 per week**

Course Outcome:

By the time students complete this course they will be able to:

1. Acquire knowledge in the principles and practice of learning, including regional spatial structure and economic development.
2. Enable students with skills necessary for the effective practice of planning, including its purpose and meaning, methods that envision future change, elements of plans, plan preparation and implementation.
3. Make students able for policy formulation that almost society need.
4. Develop values and ethical standards among students necessary to affect the practice of planning, including the values of justice, equity, fairness, efficiency, order and beauty.

Unit I: Region and Regional Planning

1. Concept of growth and development; Indicators of regional development
2. Economic Base theory, Concept of multiplier effect and Core-periphery model
3. appreciation of Christaller's theory, Growth Pole Model of Perroux, Growth Centre Model in Indian context
4. Regional Disparity and Regional Diversity, Measurement of regional Development

Unit II: Regional Planning for Development

1. Concept of growth and development; Indicators of regional development
2. Economic Base theory, Concept of multiplier effect and Core-periphery model
3. Critical appreciation of Christaller's theory, Growth Pole Model of Perroux, Growth Centre Model in Indian context
4. Regional Disparity and Regional Diversity, Measurement of regional Development

Unit III: Regional Planning Geography (Practical)

1. Delineation of formal region (Single criteria: Physical/Social/Economic)
2. Delineation of functional region (Single criteria: Flow of People/Goods/Services)
3. Z-Score and its application in regional development measurement; Analysis of regional disparity after Sopher's Index
4. Lab Note Book and Viva Voce

Text and Reference Books

- *Bhat, L.S. et. al.: Micro-Level Planning – A Case Study of Karnal Area, Haryana, K.B. Publications, New Delhi, 1976*
- *Bhat, L.S.: Regional Planning in India, Statistical Publishing Society, Calcutta, 1973*
- *Chandana, R.C.: Regional Planning and Development, Kalyani Publishers, (Latest Edition)*
- *Choudhury, Jayashri Ray: An Introduction to Development and Regional Planning: With Special Reference to India: Orient Blackswan, (Latest Edition)*
- *Christaller, W.: Central Places in Southern Germany, Translated by C.W. Baskin, Prentice Hall, New Jersey, 1966*
- *Friedmann, J. and Alonso, W.: Regional Development and Planning – A Reader, M.I.T. Press, , 1967*
- *Friedmann, J. and Alonso, W.: Regional Development Policy – A Case Study of Venezuela, M.I.T. Press, Cambridge, Massachusetts, 1966*
- *Glikson, A.: Regional Planning and Development, Netherlands Universities Foundation for International Co-operation, London, 1955*

- *Kuklinski, A.R. (ed.): Growth Poles and Growth Centres in Regional Planning, Mouton, The Hague, 1972*
- *Misra, R.P. et. al.: Multi-Level Planning, Heritage Publishers, New Delhi, 1980*
- *Misra, R.P.: Regional Planning – Concepts, Techniques and Policies, University of Mysore, Mysore, 1969*
- *Mrydal, G.: Economic Theory and Under-Development Regions, Gerald Duckworth, London, 1957*

Course Name: **Research Methodology and Fieldwork**
Course Code: **GEOUGCC12**
L+T+P: **4+0+2 per week**

Course Outcome:

By the time students complete this course they will be able to:

1. Learn a basic understanding of concepts and principles ofresearch methodology, objectives, research gap, hypothesis, and literature of review.
2. Know the to design to research, sampling, data manipulation, process and techniques of research.
3. Prepare questionnaire and taking interviews of respondents on ground.
4. Learn different instruments on ground and making different maps using GIS software
5. Learn to complete research report or dissertation on field based through collected data on social and physical study to follow the generated research design.

Unit I: Research Methodology

1. Research methods and methodology: spirit and purpose
2. Literature review, research gaps, and framing of hypothesis and objectives
3. Data collection- primary and secondary; sampling design; Data manipulation and processing techniques: coding and decoding of data, treatment of missing data;
4. Reporting of research: principles, forms (report, dissertation, thesis, article and research paper); preparation of reference and bibliography; Research ethics and Plagiarism

Unit II: Field work

1. Field works- meaning, principles and objectives; Importance and Constraints of field work in Geography
2. Selection of the study area and Target population; management of field emergency
3. Field work for social environment- Selection of the Appropriate Technique; Observation (Participant / Non Participant), Questionnaires (Open/ Closed / Structured / Non-Structured); Narratives, Interview, Focused Group Discussions; Participatory research approach (PRA), tape and video recording
4. Field work for physical environment- instrumental survey, LULC, sample collection, photo / image analysis

Unit III: Research Methodology and Field work (Practical)

1. Field Report and viva Voice.
   Every student needs to participate in fieldwork and prepare a field report according to the following guideline, failing which he/she will not be evaluated for GEO-A-CC-5-11-P.
2. Each student will prepare a report based on primary data collected from field survey and secondary data collected from different sources.
3. Students will select either one rural area (*mouza*) or an urban area (municipal ward) for the study, with the primary objective of evaluating the relation between physical and cultural landscape.
4. A specific problem or a special feature should be identified based on which, the study area will be selected.

5. The report should be handwritten in English on A4 size paper in candidate's own words within 5,000 words (Introductory Chapter: 1000 words; Physical Aspects: 1500 words; Socio-economic Aspects: 1500 words; Concluding Chapter: 500 words, approximately) excluding tables, photographs, maps, diagrams, references and appendices.
6. Photographs, maps and diagrams should not exceed 15 pages.
7. A copy of the bound report, duly signed by the concerned teacher, will be submitted during examination. Level (with the help of a questionnaire) in the selected study area.
8. **The field work and post-field work will include:**
   a. Collection of primary data on physical aspects (relief and soil) of the study area. Students should use survey instruments like prismatic compass, dumpy level, Abney level or clinometers wherever necessary.
   b. Collection of soil samples from different land cover land use regions of the study area for determining pH and NPK values with help of a soil kit., c. Collection of socio economic data, at the household, d. Plot to plot land use survey for preparation of a land use map, covering whole or part of the selected area. e. Visit to different organizations and departments for collection of secondary data. f. Any other survey relevant to the objective of the study.
9. **The Field Report should contain the following sections (a–c).**

a. **Introduction:** Study area extent and space relations, reasons for selection of the study area on the basis of a specific problem or special feature, objectives, methods of data collection, analyses and presentation, sources of information, etc. b. **Physical aspects:** Lithology and geological structure, relief, slope, drainage, climate, soil, vegetation, environmental issues, proneness to natural hazards, etc. c. **Socio-economic aspects:** i. Population attributes: Number, sex ratio, literacy, occupational structure, ethnic and religious composition, language, per capita income, etc. ii. Settlement characteristics: Number of houses, building materials, number and size of rooms, amenities, etc. iii. Agriculture: General land use, crop-combination, use of fertilizer and irrigational facilities, production and marketing etc. iv. Other economic activities: Fishing, horticulture, brick-making, household and other industries, etc.

Text and Reference Books

- Kothari, C. R. (2004). *Research methodology: Methods and techniques*. New Age International.
- Ahuja, R. (2001). *Research methods*. Rawat.
- Mc Million, O. (1969). SPIRIT AND PURPOSE OF GEOGRAPHY-WOOLDRIDGE, SW AND GORDON, W.
- Clifford, N., Cope, M., Gillespie, T.W., French, S. (Eds) 2016. Key Methods in Geography, 3rd ed, Sage.
- Gomes, B., Jones III, J.P. (Eds) 2010. Research Methods in Geography: A Critical Introduction, WileyBlackwell.
- Lenon, B., Cleves, P. 2015. Geography Fieldwork and Skills, Harper-Collins.
- Montello , D.R, Sutton, P. 2012. An Introduction to Scientific Research Methods in Geography and Environmental Studies, 2nd ed, Sage.
- Parsons, T., Knight, P.G. 2015. How To Do Your Dissertation in Geography and Related Disciplines, 3rd ed, Routledge.
- Thornbush, M.J., Allen, C.D., Fitzpatrick, F.A. (Eds) 2014. Geomorphological Fieldwork, Elsevier

Course Name: **Evolution of Geographical Thought**
Course Code: **GEOUGCC13**
L+T+P: **4+0+2 per week**

Course Outcome:

By the time students complete this course they will be able to:

1. Assess the nature and trend in ancient, medieval, modern and post-modern periods in the field of geography and acquire knowledge about the future prospects of Geography as a discourse
2. Develop an idea about the relation with other disciplines
3. Develop a concept on philosophical and methodological issues in the development of the discipline of geography
4. Make differentiate between location, space and place.
5. Understand the process of paradigm shift in the approaches to study geography

Unit I: Nature of Pre Modern and Modern Geography

1. Foundation of Geography and its relation with other disciplines
2. Geographical ideas during ancient period: Contribution of Greek and Roman scholars
3. Impact of 'Dark Age' on Geography and development of Geography during Medieval Period: Arab contributions
4. Modern schools of thought: Germany, France, United States of America, India

Unit II: Contemporary issues and Recent Trends in Geography

1. Dichotomy and dualism – Environmental Determinism and Possibilism, Systematic and Regional, Ideographic and Nomeothetic- Physical and Human; Areal Differentiation and Spatial Organisation
2. Post War Geography: Quantitative Revolution and its Impact, Behaviouralism, Humanism, Radicalism, Feminism, Structuralism
3. Concept of Location, Time and Space
4. Towards post modernism: Geography in the 21st Century, Future of Geography

Unit III: Evolution of Geographical Thought (Practical)

1. Assignment on history of map making/Methods of research in geography
2. Identification of Absolute and Relative space
3. Models of studying human behaviour- Behavioral matrix after Pred and Lewin's equation/ Decision making by game theory
4. Laboratory note book and viva voice

Text and Reference Books

- *Adhikari, S. 2015. Fundamentals of Geographical Thought, Orient Blackswan.*
- *Clifford, N. Holloway S.L., Rice, S.P., Valentine, G. 2009. Key Concepts in Geography, 2nd Ed, Sage.*
- *Couper, P. 2015. A Student's Introduction to Geographical Thought: Theories, Philosophies,*
- *Cresswell, T. 2013. Geographic Thought: A Critical Introduction, Wiley-Blackwell.*
- *Dikshit, R.D. 2004. Geographical Thought: A Contextual History of Ideas, Prentice Hall India.*
- *Gregory, D., Johnston, R., Pratt, G., Watts, M., Whatmore, S. (Eds) 2009. The Dictionary of Human Geography, 5th Ed, Wiley.*
- *Holt-Jensen, A. 2011. Geography: History and Concepts: A Student's Guide, Sage.*

- *Husain, M. 2015. Evolution of Geographical Thought, 6th Ed, Rawat Publications.*
- *Methodologies, Sage.*
- *Pete, P. 1998. Modern Geographical Thought, Wiley-Blackwell.*

Course Name: **Disaster Management**
Course Code: **GEOUGCC14**
L+T+P: **4+0+2 per week**

Course Outcome:

By the time students complete this course they will be able to:

1. Learn a basic understanding the basic conception, classification and different parameters of hazards and disasters.
2. Gain knowledge about approaches and acquire knowledge about human induced disaster.
3. Develop an idea about factors, consequences and management of earth quakes, landslide, flood and river bank erosion.
4. Familiar how to gather field based data of flood, landslides, earthquake and human induced disaster.
5. Generate the plot or thematic mapping of hazards or disaster phenomena.

Unit I: Concepts and Perception of Hazards

1. Concepts of hazards and disasters; Hazard paradigms; Classification of hazards and disasters
2. Approaches to hazard study: Risk perception and vulnerability assessment
3. Responses to hazards: Preparedness, trauma and aftermath. Resilience and capacity building
4. Hazards mapping: Data and techniques

Unit II: Disaster Case Studies

1. Geomorphic hazards- Landslide and Riverbank erosion
2. Atmospheric hazard- Tropical cyclone and cloud burst
3. Hydrological Hazards- Flood and drought
4. Human Induced Disasters: Industrial accidents and social violence

Unit III: Field Based Project (Practical)

1. Each student will prepare an individual report based on primary data collected form field survey and/ or secondary data collected from different sources to study specific problems
2. The duration of the field work shall not exceed 7 days
3. The report should be computer typed in English on A4 size paper in candidate's own language within 3,000 words excluding figures, tables, photographs, maps, references and appendices
4. Project Report and Viva Voce

Text and Reference Books

- Smith, K. (2003). *Environmental hazards: assessing risk and reducing disaster*. Routledge.
- Paul, B. K. (2011). *Environmental hazards and disasters: contexts, perspectives and management*. John Wiley & Sons.
- Cutter, S. L. (2012). *Hazards vulnerability and environmental justice*. Routledge.
- Blaikie, P., Cannon, T., Davis, I., & Wisner, B. (2005). *At risk: natural hazards, people's vulnerability and disasters*. Routledge.
- White, G. F. (1974). *Natural hazards, local, national, global*. Oxford University Press.

- Montz, B. E., Tobin, G. A., & Hagelman, R. R. (2017). *Natural hazards: explanation and integration*. Guilford Publications.
- Comfort, L. K. (Ed.). (1988). *Managing disaster: Strategies and policy perspectives*. Durham: Duke University Press.
- Hodgkinson, P. E., & Stewart, M. (1991). *Coping with catastrophe: A handbook of disaster management*. Taylor & Frances/Routledge.
- Shaw, R. (Ed.). (2012). *Community based disaster risk reduction*. Emerald Group Publishing.
- Shaw, R., Shiwaku, K., & Takeuchi, Y. (Eds.). (2011). *Disaster education*. Emerald Group Publishing.
- *Archeer, J.E. and Dalton, T.H. Fieldwork in Geography, London, 1968.*
- *Glodard, R.H., Field Techniques and Research Methods in Geography, Dubuque, 1982.*
- *Jones, P.A., Fieldwork in Geography, London, 1968*
- *Stoddard R. H., 1982: Field Techniques and Research Methods in Geography, Kendall/Hunt.*
- *Wheeleso, K.S. and Harding, M., Geographical Fieldwork, London, 1965.*
- *Wolcott, H. 1995. The Art of Fieldwork. Alta Mira Press, Walnut Creek, CA*

Course Name: **Urban Geography**
Course Code: **GEOUGDS01**
L+T+P: **4+0+2 per week**

Course Outcome:

By the time students complete this course they will be able to:

1. Acquire knowledge of, understand, and critique key paradigms and approaches in urban geography (industrial location, urban form, urban growth, urbanization etc.)
2. Able students to link these topics and approaches to specific cases.
3. Develop skills in the critical analysis of existing theories, urbanization, and urban problems.
4. Apply the knowledge in an analysis of urban social or public policy.
5. Develop new visions among the students on the relevance of an urban space, environment, economy and geography and related problems in a rapidly urbanizing world.

Unit I: Perspectives in Urban Geography

1. Nature and Scope of Urban geography
2. Theories of Urbanization: Agriculture surplus, Hydraulic theory, Trading requirements (Economic theory)
3. Hierarchy of Urban Settlements; Rank Size Rule; Primate City; Functional and Census classification of Indian cities
4. Sphere of urban influence; Rural-urban fringe and continuum, City region, Urban outgrowth and sprawl

Unit II: Structure, Process and Forms of Urbanization

1. Internal structure of cities (After Burgess, Hoyt, Harris and Ullman), Inner problems and structural elements of CBD
2. Metropolitan Concept: Metropolis, Metropolitan Area, Metropolitan Region, Mega City, Megalopolis, Smart City and Technopolis
3. Process of urbanization and Concept of urbanism
4. Patterns and Trends of Urbanization in India

Unit III: Urban Geography (Practical)

1. Urban Growth analysis- Spatial & Temporal, Index of Urbanization
2. Rank Size Distribution of Cities
3. Dominant and distinctive Functions after Nelson: Functional classification after Ashok Mitra
4. Lab Note book and Viva Voce

Text and Reference Books

- *Hall T., 2006: Urban Geography, Taylor and Francis.*
- *Kaplan D. H., Wheeler J. O. and Holloway S. R., 2008: Urban Geography, John Wiley.*
- *Knox P. L. and McCarthy L., 2005: Urbanization: An Introduction to Urban Geography, Pearson Prentice Hall New York. Knox P. L. and Pinch S., 2006: Urban Social Geography: An Introduction, Prentice-Hall.*
- *Mahala. O.M., Urban Governance in India, emerging challenges in Liberalised Era,2011*
- *Mondal, R.B.: A text Book on Urbanization*
- *Pacione M., 2009: Urban Geography: A Global Perspective, Taylor and Francis.*

- *Ramachandran R (1989): Urbanisation and Urban Systems of India, Oxford University Press, New Delhi*
- *Ramachandran, R., 1992: The Study of Urbanisation, Oxford University Press, Delhi*

Course Name: **Agricultural Geography**
Course Code: **GEOUGDS02**
L+T+P: **4+0+2 per week**

Course Outcome:

By the time students complete this course they will be able to:

1. Obtain information regarding various agricultural issues and food security status and insecurity in India and remedies.
2. Gain knowledge for demarcating agricultural regions through various models and theories.
3. Know about various agricultural factors effects on performance and development of agriculture sector in India.
4. Learn some strategies and land use planning for agricultural development.
5. Learn also few methods such as Crop Calender, Crop combination, diversification and determination of crop productivity.

Unit I: Agricultural Geography-I

1. Nature and Scope of Agricultural Geography
2. Concept and Theories of Land use (Stamp and Lewis), land capability classification
3. Factors determining Agricultural Performance: Physical, Technological and Institutional
4. Whittlessey's classification of agricultural systems of the world and Land Use Location Theory - Von Thunen and its applicability

Unit II: Agricultural Geography-II

1. Dimensions of Agricultural Development: Productivity, Diversification, Commercialization.
2. Agricultural Revolution in India – Green, White and Blue
3. Food (in)security and its components; Early warning system for food (in)security; Monitoring factors affecting food (in)security
4. Land use planning for agricultural development; Strategies in agricultural planning and development in India; Role of IMF and World Bank in agricultural policies

Unit III: Agricultural Geography (Practical)

1. Crop Calendar
2. Crop-combination (Rafiullah's method) and crop-diversification (Gibb's-Martin index)
3. Determination of crop-productivity (Stamp and Shafi methods)
4. Laboratory note book and viva voice

Text and Reference Books

- *Bajpai, S., Survey on Indian Agriculture: Cyber Tech Pub, 2009,*
- *Basu, D.N., and Guha, G.S., 1996: Agro-Climatic Regional Planning in India, Vol. I & II, Concept Publication, New Delhi.*
- *Burger, A., 1994: Agriculture of the World, Aldershot, Avebury.*
- *Duckhan, A.N. and Masfield, G.B., Farming Systems of the World, London, 1970.*
- *Finney, D.J., An Introduction to Statistical Science in Agriculture : Axis Books, 2010*
- *Gautam, A. 2016: Agricultural Geography, Shardha Pustak Bhawan.*

- *Grigg, D.B., 1984: Introduction to Agricultural Geography, Hutchinson, London.*
- *Griggs, D.G., An Introduction to Agricultural Geography, 1964.*
- *Husain, Majid., Agricultural Geography, New Delhi.*
- *Khanduri, V.P.(Eds.),Advances in Agricultural Research in India : Vol. XV-XVI,*
- *Kothari, S., Agricultural Landuse and Population : A Geographical Analysis : Udaipur, 1999*
- *Mohammad, A., Food Production and Food Problem in India, New Delhi.*
- *Mohammad, N., 1992: New Dimension in Agriculture Geography, Vol. I to VIII, Concept Pub., New Delhi.*
- *Morgan, W.B. and Munton, P.J.C. Agricultural Geography, London, 1971.*
- *Shafi, M., Agricultural Geography of South Asia, Macmillon, New Delhi 2000.*
- *Shafi, M., Agricultural Geography, Dorling Kindersley, New Delhi, 2006*
- *Singh, J. and Dhillon, S.S., Agricultural Geography, 1970.*
- *Symons, L., Agricultural Geography, London, 1967.*
- *Tarrant J. R., 1973: Agricultural Geography, David and Charles, Devon.*

Course Name: **Environmental Geography**
Course Code: **GEOUGDS03**
L+T+P: **4+0+2 per week**

Course Outcome:

By the time students complete this course they will be able to:

1. Acquire knowledge of the nature of the subject, environmental geography and learn many key concepts.
2. Learn components of environment and principles of ecology.
3. Understand the concept, types, characteristics and function of Ecosystem.
4. Know dynamics of Ecosystem along with different functions, Ecological Pyramids and Models of Ecosystem.
5. Understand man and environment relationship that they affect each other from Deterministic and Possibilistic perspective.
6. Know how plant response to physical environment and animal response to physical environment.
7. Learn causes, consequences and management of deforestation and different types of pollution i.e. water, air and soil pollution and know the issues and concerns for Bio-diversity.
8. Prepare of questionnaire for perception survey on environmental problems (Air Pollution and Health Perception Survey).
9. Develop hands on training on measurement of quality assessment of soil using field kit: pH and NPK.
10. Make Map of wetlands and forests.

Unit I: Elementary Concepts of Environmental Geography

1. Nature and Scope of Environmental Geography; Key Concepts Ecocline, Ecotone, Niche
2. Components of Environment; Principles of Ecology: Natural and Human
3. Concept, Types and Characteristics of Ecosystem; structure and organisation of Ecosystem
4. Dynamics of Ecosystem: Functions (Energy Flow, Biogeochemical Cycles, Gross and Net Productivity), Ecological Pyramids; Models of Ecosystem; Ecosystem Processes

Unit II: Man-Environment Interactions

1. Man and Environment Relationship: Effects of Environment on man (Deterministic); Effects of Man on Environment with changes in Mode of Production (Possibilistic)
2. Plant response to physical environment: Habitat factors and Animal response to physical environment, means and barriers to animal dispersal. Adaptation (Hydrophytes, Xerophytes and Halophytes)
3. Causes, consequences and management of deforestation; Water, Air and soil pollution
4. Bio-diversity: Issues and Concerns

Unit III: Environmental Geography (Practical)

1. Preparation of questionnaire for perception survey on environmental problems (Air Pollution and Health Perception Survey)
2. Quality assessment of soil using field kit: pH and NPK

3. Mapping of Wetlands and Forest
4. Laboratory note book and viva voice

Text and Reference Books

- *Chandna R. C., 2002. Environmental Geography. Kalyani, Ludhiana.*
- *Cunninghum W. P. and Cunninghum M. A., 2004. Principals of environmental science: Inquiry and Applications. Tata Macgraw Hill, New Delhi.*
- *Gilpin, A. 1994. Environmental Impact Assessment: Cutting Edge for the 21st Century (EIA: Cutting Edge for the Twenty-First Century. Cambridge University Press)*
- *Goudie A. 2001. The Nature of the Environment. Blackwell, Oxford.*
- *Kormondy, Edward J.2012.Concepts of Ecology. PHI Learning Pvt. Ltd., New Delhi.*
- *Miller G. T. 2004. Environmental Science: Working with the Earth, Thomson, Brooks Cole, Singapore.*
- *Odum, E. P. et al. 2005.Fundamentals of Ecology. Ceneage Learning, India.*
- *Sharma, P.D. 2015. Ecology and Environment. Rastogi Publications, Meerut.*
- *Singh, R.B. (Eds.) (2009) Biogeography and Biodiversity. Rawat Publication, Jaipur.*
- *Singh, R.B. 1998. Ecological Techniques and Approaches to Vulnerable Environment. Oxford & IBH Pub, New Delhi.*
- *Singh, R.B. and Hietala, R. (Eds.) (2014) Livelihood security in North western Himalaya: Case studies from changing socio-economic environments in Himachal Pradesh, India. Advances in Geographical and Environmental Studies. Springer.*
- *Singh, S. 1997. Environmental Geography. Prayag Pustak Bhawan. Allahabad*

Course Name: **Fluvial Geomorphology**
Course Code: **GEOUGDS04**
L+T+P: **4+0+2 per week**

Course Outcome:

By the time students complete this course they will be able to:

1. Understand different fluvial forms and processes i.e. entrainment, erosion, transportation and deposition.
2. Perceive the causes of tropical flood and also different measures for flood management.
3. Develop an overview of the drainage basin.
4. Understand how human alters the natural river processes.
5. Identify the different channel and drainage pattern from survey of India topographical maps (1:50000) and also learn to compute sinuosity index and braiding index.
6. Prepare the flood risk map and drainage basin management.
7. Measure the spatio-temporal dynamics river bankline shifting.

Unit I: Theoretical Perspective

1. Stream Classification- Rosgen
2. Drainage basin as a fundamental unit of geomorphic study- linear, areal and relief
3. Fluvial processes: entrainment, erosion, transportation and deposition; Hjulstrom curve, Reynolds number, Froude number, Manning's coefficient, Chezy equation
4. Fluvial forms : alluvial fan, terrace, and Delta

Unit II: Applied Fluvial Geomorphology

1. Tropical floods and their management
2. River bank erosion in the Ganga Brahmputra Delta and its management
3. Channel changes by human interventions: processes, forms and restoration
4. Integrated watershed management: principles and practice

Unit III: Fluvial Geomorphology (Practical)

1. Identification of channel pattern and drainage pattern from 1:50000 SOI toposheets; computation of sinuosity index and channel braiding
2. Channel asymmetry analysis- Knighton's measures; bed asymmetry analysis
3. Bank line shifting analysis to measure river bank erosion; preparation of flood risk map
4. Laboratory note book and Viva voice

Text and Reference Books

- Gupta, A. (2011). *Tropical geomorphology*. Cambridge University Press.
- Schumm, S. A., Mosley, M. P., & Weaver, W. (1987). Experimental fluvial geomorphology.
- Leopold, L. B., Wolman, M. G., & Miller, J. P. (2012). *Fluvial processes in geomorphology*. Courier Corporation.
- Thorne, C., Hey, R., & Newson, M. (2005). *Applied fluvial geomorphology for river engineering and management*. John Wiley and Sons Ltd.
- Charlton, R. (2007). *Fundamentals of fluvial geomorphology*. Routledge.

- Kondolf, G. M., & Piégay, H. (2003). *Tools in fluvial geomorphology. Problem statement and recent practice* (pp. 3-22). Chichester, Wiley.
- Doornkamp, J. C., & King, C. A. M. (1971). *Numerical analysis in geomorphology* (p. 372). Ed. Arnold.
- Chorley, R. J. (2019). *Introduction to fluvial processes*. Routledge.
- Knighton, D. (2014). *Fluvial forms and processes: a new perspective*. Routledge.
- *Chorley, R.J., Schumm, S. A. and Sugden, D.E. 1984: Geomorphology, Methuen, London.*
- *Kale, V. and Gupta, A. 2001: Introduction to Geomorphology, Orient Longman, Kolkata.*
- *Sarkar, A.: Practical Geography: A Systematic Approach, 2nd edition, Orient Longman Ltd., Hyderabad, 2009*
- *Sen, P.K. 1989. Geomorphological Analysis of Drainage Basin: An Introduction to Morphometric and Hydrological Parameters, University of Burdwan*

Course Name: **Population Geography**
Course Code: **GEOUGDS05**
L+T+P: **4+0+2 per week**

Course Outcome:

By the time students complete this course they will be able to:

1. Will learn different concepts, theories, population dynamics and the issues related to population and development.
2. Understand different measurements to population growth and dynamics of growth of population.
3. Understand the concepts of development and displacement, difference between environmental refugee and displaced people, and also an internally displaced person, an asylum-seeker, and a refugee,
4. Describe a number of population policies of countries with small and stable population and also fast growing countries.
5. Population projection using both linear and exponential and other basic measures of population.

Unit I: Concept, Theories and Dynamics of Population

1. Population Geography as a field of specialization; Relationship between population geography and demography, nature and sources of population data
2. Classical and modern theories on population growth, Demographic transition model
3. Structure and Composition of Population: Age–sex, Occupation, Literacy, Rural–urban and social composition.
4. Determinants and Dynamics of Population Growth; Measurements of major components of population dynamics - fertility, mortality and migration

Unit II: Population Growth and Development

1. Growth and Distribution of World Population; Population growth, distribution and density in India with trend and regional pattern;
2. Migration: Theories (Lee and Ravenstien), Scale, Causes and Consequences
3. Population policies in India, China and Sweden
4. Population growth and development: concept of Human Development and its components; Gender Development, Ageing of population, Urban Lifestyle and Health, Development and Displacement

Unit III: Laboratory exercises (Practical)

1. Population projection: Linear growth by Arithmetic method.
2. Population density and distribution mapping
3. Work participation rate and occupational structure
4. Laboratory notebook and viva voice

Text and Reference Books

- *Barrett, H.R. 1995. Population Geography, Oliver and Boyd.*
- *Bartram, D. Poros, M. Monforte, P. 2014. Key Concepts in Migration, Sage Publications.*
- *Bhende, A. A., Kanitkar, T. 2000. The Principle of Population Studies, Himalaya Publications.*
- *Chandna, R. C. 2016. Geography of Population: Concepts, Determinants and Patterns, Kalyani Publishers.*
- *Dyson,T. 2011. Population and Development: The Demographic Transition, Rawat Publications.*

- *Gregory, D., Johnston, R., Pratt, G., Watts, M., Whatmore, S. (Eds) 2009. The Dictionary of Human Geography, 5th Ed, Wiley.*
- *Hassan, M.I. 2005. Population Geography, Rawat publications.*
- *Jhingan, M.L., Bhatt, B.K., Desai, J. N. 2014. Demography, Vrinda Publications.*
- *Jones, H. R. 2000. Population Geography, 3rd ed, Chapman.*
- *Khullar, D.R. 2011. India: A Comprehensive Geography, Kalyani Publishers.*
- *Lutz, W., Warren, C.S., Scherbov, S. 2004. The End of the World Population Growth in the 21st Century, Earthscan.*
- *Mahmood, A. 1998. Statistical Methods in Geographical Studies, Rajesh Publication, New Delhi.*
- *Majumdar, P. K. 2013. India's Demography: Changing Demographic Scenario in India, Rawat Publications.*
- *Monkhouse, F. J., Wilkinson, H.R. 1971. Maps and Diagrams: Their Compilation and Construction, 3rdEd (2017 reprint), Alphaneumera-Kolkata.*
- *Mukherji, S. 2013. Migration in India: Links to Urbanization, Regional Disparities and Development Policies, Rawat Publications.*
- *Newbold, K.B. 2017. Population Geography: Tools & Issues, 3rd Ed, Rowman& Littlefield Publishers.*
- *Pacione, M. 2012. Population Geography: Progress and Prospect, Routledge.*
- *Publications.*
- *Sarkar, A. 2015. Practical Geography: A Systematic Approach, 3rd Ed, Orient Blackswan Private Ltd.*
- *Singh, R.L. and Singh, R.P.B.: Elements of Practical Geography, Kalyani Pub. New Delhi, 1991*
- *Summerfield, M.A. 1992: Global tectonics and Landforms*
- *Thornbury, W.D. 1954: Principles of Geomorphology, John Wiley, New York.*

Course Name: **Settlement and Transport Geography**
Course Code: **GEOUGDS06**
L+T+P: **4+0+2 per week**

Course Outcome:

By the time students complete this course they will be able to:

1. Build an idea about urban and rural settlements, and its relationship with environment
2. Differentiate the characteristics between rural and urban settlement
3. Know about classification and hierarchy of urban settlements.
4. Examine the relationship between transport and regional development through different theories.
5. Build up thorough theoretical knowledge about the transport and economic development
6. Develop an idea about new transport strategic planning in India and its relevance on India's development
7. Make them employable for the contemporary job markets.
8. Develop to handle projects of their own from designing to implementation.

Unit I: Settlement Geography

1. Scope and Contents of Settlement Geography; Settlement as a system
2. Rural Settlements: Definition and Characteristics of Rural Settlement; Site and Situation, Social segregation in rural areas
3. Urban Settlements: Definition and characteristics; Types of urban settlements and Hierarchy; Urban Agglomeration
4. Functional Classification of Towns: Harris and Nelson

Unit II: Transport Geography

1. Scope and Contents of Transport Geography
2. Transportation and economic development; Theories of Transport Development after Taaffe, Theory of Transport and Regional Development after Rostow and Taaffe
3. Functions of transport terminals, structural analysis of transport network, , Transport supply and demand; Transport and environment: environmental impacts on transportation
4. New Transport Strategic Planning in India: PMGSY, Golden Quadrilateral, Freight Corridor, N-S and E-W Corridor

Unit III: Settlement and Transport Geography (Practical)

1. Nearest neighbor analysis
2. Social area analysis of a city
3. Transport network analysis: Measuring accessibility (detour index and shortest path analysis) and connectivity indices (Alpha, Beta & Gamma)
4. Laboratory notebook and viva voice

Text and Reference Books

- *B.S. Hoyle and Richard Knowles, Modern Transport Geography, Willey*
- *Giuliano, G., Hanson, S. (Eds) 2017. The Geography of Urban Transportation, 4th Ed, Guilford Press.*
- *Jean-Paul Rodrigue, The Geography of Transportation System, Taylor & Francis*

- *Richard D. Knowles, John Shaw, Transport Geographies: Mobilities, Flows and Spaces, Blackwell*
- *Saxena, H.M. 2005. Transport Geography, Rawat Publications.*
- *SuklaBhaduri Transport and Regional Development: A Case Study of Road Transport of West Bengal, Concept Publishing Co*

Course Name: **Hydrology and Oceanography**
Course Code: **GEOUGDS07**
L+T+P: **4+0+2 per week**

Course Outcome:

By the time students complete this course they will be able to:

1. Understand the functions of the global and basin hydrological cycle and its different components.
2. Gain knowledge about different forms and occurrences of fresh water.
3. Comprehend the origin of different sub-marine features in the light of plate tectonics.
4. Understand different physical and chemical properties of sea water.
5. Perceive the interaction between air and ocean and the development of ENSO
6. Prepare beach profile with the help of Auto level and GPS.
7. Measure the coastline shifting with the help of GIS software.

Unit I: Hydrology

1. Forms and occurrence of water on the earth
2. System analysis in Hydrological Cycle : Global and Basin Hydrological Cycle
3. Controlling factors of Infiltration, Run off and Evapotranspiration
4. Occurrence and movement of Ground water

Unit II: Oceanography

1. Submarine features and their Origin in the light of Plate Tectonics; Major feature of ocean floor: Indian, Atlantic, Pacific
2. Physical and Chemical properties of seawater; Ocean currents- Origin, types, importance; Waves and Tides – Origin, pattern and morphology; Water masses- T-S Diagram
3. Coral reef- Origin, growth and threats
4. Ocean-air interaction: ENSO; Sea level rise and its implications

Unit III: Hydrology and Oceanography (Practical)

1. Preparation of Hydrograph and Unit hydrograph and their applications; Preparation of Rating curve and its application
2. Measurement of morphology of sea waves; Beach Profiling with Auto-level and GPS
3. Coastline Shifting and coastline erosion with the help of GIS software
4. Laboratory note book and viva voice

Text and Reference Books

- *Chow, Maidment and Mays (1988) Applied Hydrology. Singapore. McGraw Hill Company*
- *Davis, R.J.A.: Oceanography – An Introduction to the Marine Environment, C.Brown, Iowa, 1986*
- *Duxbury, C.A. and Duxbury, B.: An Introduction to the World's Oceans, 2nd edition, C. Brown, Iowa, 1996*
- *Garrison, T.: Oceanography – An Introduction to Marine Science, Books / Cole, Pacific Grove, 2001*
- *King, C.A.M., Oceanography for Geographers, 1962*
- *Monkhouse, F.J., Wilkinson, H.R. 1971. Maps and Diagrams: Their Compilation and Construction, 3rd Ed (2017 reprint), Alphaneumera-Kolkata.*

- *Raghunath, H.M. 2006. Hydrology: Principles, Analysis, Design, 3rd ed, New Age International Publishers.*
- *Reddy, P.J.R. 2014. A Textbook of Hydrology, University of Science Press.*
- *Richard J. Chorley (Ed.), 1969. Water, Earth and Man. A synthesis of Hydrology, Geomorphology, and Socio–Economic Geography. Methuen and Co. Ltd., London; Barnes and Noble, New York.*
- *Sen, P.K. 1989. Geomorphological Analysis of Drainage Basin: An Introduction to Morphometric and Hydrological Parameters, University of Burdwan*
- *Sharma, R.C., The Oceans, Rajesh Publications, New Delhi, 1985*
- *Sverdrup, Johnson and Fleming: Ocean-Their Physics, Chemistry and General Biology.*
- *Todd, D.K., Larry, W.M. 2004. Groundwater Hydrology, John Wiley & Sons.*
- *Ummerkutty, A.N.P.: Science of the Oceans and Human Life, National Book Trust, New Delhi, 1985*

Course Name: **Social and Cultural Geography**
Course Code: **GEOUGDS08**
L+T+P: **4+0+2 per week**

Course Outcome:

By the time students complete this course they will be able to:

1. Evaluate the social issues such as- racism, cast conflict, social distance.
2. Understand the causes of social inequality and their impact on society.
3. Understand indicators of social well-being and quality of life..
4. Discuss about the social space, social groups and intra-urban mobility.
5. Define the cultural region of the world.
6. learn about rural settlement morphology, urban-industrial landscape
7. Work in a collaborative setting with experience of work in the field to analyse social set-up at micro level.
8. Select and correctly reference literature to equip them for writing research reports.
9. Make them employable for the contemporary job markets.
10. Develop to handle projects of their own from designing to implementation.

Unit I: Elements of Social Geography

1. Concept, nature and scope of Social Geography; Region as a social unit; Concept of social space
2. Concept of Social Structure (Elements: Caste, Class, Religion, Race) and Social Process
3. Concept of social inequality, social justice, social pathology, Social exclusion and social segregation; Achieving social justice (welfare, well-being and social security)
4. Social Stratification in India, Social Policies in India: Sarva Shiksha Abhiyan and NRHM

Unit II: Cultural Geography

1. Concept of Culture and Development of Cultural Geography
2. Concept of Cultural Hearth, Realm; Cultural Landscape
3. Cultural Diffusion; Technology, Globalisation and Culture
4. Cultural Segregation, Cultural Diversity, and Acculturation

Unit III: Social and Cultural Geography (Practical)

1. Social Disparity after Sopher and Kundu-Rao
2. Preparation of questionnaire for perception survey on a selected social problems
3. Assignment on Community Health and Traditional Medicine of Rural Community
4. Laboratory note book and viva voice

Text and Reference Books

- *Ahmed A., 1999: Social Geography, Rawat Publications.*
- *Casino V. J. D., Jr., 2009) Social Geography: A Critical Introduction, Wiley Blackwell.*
- *Cater J. and Jones T., 2000: Social Geography: An Introduction to Contemporary Issues, Hodder Arnold.*
- *Holt L., 2011: Geographies of Children, Youth and Families: An International Perspective, Taylor & Francis.*
- *Panelli R., 2004: Social Geographies: From Difference to Action, Sage.*
- *Rachel P., Burke M., Fuller D., Gough J., Macfarlane R. and Mowl G., 2001: Introducing Social Geographies, Oxford University Press.*
- *Smith D. M., 1977: Human geography: A Welfare Approach, Edward Arnold, and London.*

- *Smith D. M., 1994: Geography and Social Justice, Blackwell, Oxford.*
- *Smith S. J., Pain R., Marston S. A., Jones J. P., 2009: The SAGE Handbook of Social Geographies, Sage Publications.*
- *Sopher, David (1980): An Exploration of India, Cornell University Press, Ithasa*
- *Valentine G., 2001: Social Geographies: Space and Society, Prentice Hall*

Course Name: **Remote Sensing and GIS**
Course Code: **GEOUSE01**
L+T+P: **2+0+2 per week**

Course Outcome:

By the time students complete this course they will be able to:

1. Learn a basic understanding of concepts and principles ofremote sensing and GIS data.
2. Familiar with ground, air, and satellite based sensor platforms.
3. Understand Geographic Information Systems GIS data types, utility and database management.
4. Know the GNSS positioning, waypoint collection by GPS, and transferring and calculation of area and length from GNSS data.
5. Study the basics concepts of map, aerial photo, and satellite images.
6. Know the different software of RS & GIS such as use of Erdas (remote sensing), ArcGIS (GIS) and MapInfo software.

Unit I: Basic concepts computer and RS &GIS

1. Basic concepts: map, aerial photo, and satellite image
2. Principles of Remote Sensing (RS): Types of RS satellites and sensors; Image Resolutions
3. Types of GIS data: Raster and Vector; Database Management system;
4. Geographical Information System (GIS): Components and utilities

Unit II: Global Navigation Satellite System

1. Principles of GNSS positioning
2. Waypoint collection by using GPS
3. Transferring of waypoints to workstation Google Earth
4. Length and Area calculations from GNSS data

Text and Reference Books

- *Bart James E and Gerld M. Barber, 1996: Elementary Statistics for Geographers, The Guieford Press, London.*
- *Cressie, N.A.C., 1991: Statistics for Spatial Analysis, Wiley, New York.*
- *Eldon, D., 1983: Statistics in Geography: A Practical Approach, Blackwell, London.*
- *Gregory, S., 1978: Statistical Methods and the Geographer (4th Edition), Longman, London.*
- *Haining, R.P., 1990: Spatial Data Analysis in the Social and Environmental Science, Cambridge University Press, Cambridge.*
- *Mathews, J.A., 1987: Quantitative and Statistical Approaches to Geography: A Practical Manual Pergamon, Oxford.*
- *Mc Grew, Jr. and Cahrles, B. M., 1993: An Introduction to Statistical Problem Solving in Geography,*
- *S.K., 1998: Statistics for Geoscientists: Techniques and Applications, Concept Publishing Company, New Delhi.*
- *W.C. Brocan Publishers, New Jersey.*
- *Wei, W.S., 1990: Time Series Analysis: Variate and Multivariate Methods, Addison Wesley Publishing.*

Yeates, Mauris, 1974: An Introduction to Quantitative Analysis in Human Geography, McGrawhill, New York

Course Name: **Advanced Spatial Data Analysis**
Course Code: **GEOUSE02**
L+T+P: **2+0+2 per week**

Course Outcome:

By the time students complete this course they will be able to:

1. Understand the spatial data and process of its collection.
2. Explore the mapped data.
3. Analyse spatial data to solve some real-life problems of human beings in spatial context.
4. Create map and extract inferences from it.
5. Examine the causal associations between geographical phenomena in spatial context.

Unit I: Advanced Spatial Data Analysis

1. Understanding of spatial data: Statistics and Statistical data; Spatial and non-spatial data;
2. Sampling plans for spatial and non-spatial data
3. Spatial interaction analysis: Reilly's Breaking Point Analysis; Population potential analysis
4. Spatial pattern analysis: Nearest-Neighbour Analysis; Centrality Index

Unit II: Advanced Spatial Data Analysis

1. Spatial correlation: Spatial Autocorrelation
2. Alanso's model of land use zoning
3. Spatial allometry
4. Trend surface analysis: 1st order, and 2nd order

Text and Reference Books

- *Bart James E and GerldM.Barber, 1996: Elementary Statistics for Geographers, TheGuieford Press, London.*
- *Cressie, N.A.C., 1991: Statistics for Spatial Analysis, Wiley, New York.*
- *Eldon, D., 1983: Statistics in Geography: A Practical Approach, Blackwell, London.*
- *Gregory, S., 1978: Statistical Methods and the Geographer (4th Edition), Longman, London.*
- *Haining, R.P., 1990: Spatial Data Analysis in the Social and Environmental Science, Cambridge University Press, Cambridge.*
- *Mathews, J.A., 1987: Quantitative and Statistical Approaches to Geography: A Practical Manual Pergamon, Oxford.*
- *Mc Grew, Jr. and Cahrles, B. M., 1993: An Introduction to Statistical Problem Solving in Geography,*
- *S.K., 1998: Statistics for Geoscientists: Techniques and Applications, Concept Publishing Company, New Delhi.*
- *W.C. Brocan Publishers, New Jersey.*
- *Wei, W.S., 1990: Time Series Analysis: Variate and Multivariate Methods, Addison Wesley Publishing.*
- *Yeates, Mauris, 1974: An Introduction to Quantitative Analysis in Human Geography, McGrawhill, New York*

Course Name: **Physical Geography**
Course Code: **GEOUGE01**
L+T+P: **4+0+2 per week**

Course Outcome:

By the time students complete this course they will be able to:

1. Understand the interior of earth with the help of seismology.
2. Comprehend the plate tectonics as a unified theory of global tectonics.
3. Develop an overview of the degradational process and its resultant landforms.
4. Grasp the classification and sustainable utilization of ocean resources.
5. Understand the mechanism of Global hydrological cycle and its components.
6. Comprehend different processes of rain water harvesting.
7. Identify of different Rocks and Minerals based on megascopic observations.
8. Interpret Geological maps with special reference to uniclinal and simple folded structure.

Unit I: Geotectonics and Geomorphology

1. Earth's interior with special reference to seismology
2. Plate Tectonics as a unified theory of global tectonics; Folds and faults: Classification and surface expressions
3. Degradational processes: Weathering, mass wasting, and resultant landforms
4. Principal geomorphic agents. Classification and evolution of fluvial, coastal, aeolian, and glacial landforms

Unit II: Oceanography and Hydrology

1. Ocean current, wave, and tide
2. Ocean resources: Classification and sustainable utilisation
3. Global Hydrological cycle: components and mechanism; Run off and infiltration: Controlling factors
4. Principles of watershed management; Rain water harvesting

Unit III: Physical Geography (Practical)

1. Identification of rocks and minerals : Basalt, Granite, Limestone, Sandstone, Marble, Galena, Chalcopyrite, Talc, Quartz, Hematite
2. Interpretation of geological maps: uniclinal and folded structure
3. Morphometric analysis of drainage basin: stream ordering (Strahler), relative relief, average slope
4. Laboratory note book and viva voice

Text and Reference Books

- *Billings, M.P. 1971. Structural Geology, Pearson.*
- *Goudie, A.S. (Ed) 2004. Encyclopaedia of Geomorphology, vol. 1 & 2, Routledge.*
- *Kale, V.S., Gupta, A. 2001. Introduction to Geomorphology, Orient Longman.*
- *Monkhouse, F.J. 1974. Principles of Physical Geography (2009-reprint), Platinum Publishers*
- *Selby, M.J. 1986. Earth's Changing Surface, Oxford University Press.*
- *Singh. S 2005: Physical Geography, Prayag Pub. Allahabad.*
- *Thornbury, W.D. 1954: Principles of Geomorphology, John Wiley, New York.*
- *Wooldridge, S.W. and Morgan, R.S. 1959: The Physical basis of Geography- An Outline of*

- *Singh, R.L. and Singh, R.P.B.: Elements of Practical Geography, Kalyani Pub. New Delhi, 1991*
- *Sharma, R.C., The Oceans, Rajesh Publications, New Delhi, 1985*
- *Sverdrup, Johnson and Fleming: Ocean-Their Physics, Chemistry and General Biology.*
- *Todd, D.K., Larry, W.M. 2004. Groundwater Hydrology, John Wiley & Sons.*
- *Duxbury, C.A. and Duxbury, B.: An Introduction to the World's Oceans, 2nd edition, C. Brown, Iowa, 1996*
- *Garrison, T.: Oceanography – An Introduction to Marine Science, Books / Cole, Pacific Grove, 2001*
- *King, C.A.M., Oceanography for Geographers, 1962*
- *Richard J. Chorley (Ed.), 1969. Water, Earth and Man. A synthesis of Hydrology, Geomorphology, and Socio–Economic Geography. Methuen and Co. Ltd., London; Barnes and Noble, New York.*
- *Raghunath, H.M. 2006. Hydrology: Principles, Analysis, Design, 3rd ed, New Age International Publishers.*
- *Reddy, P.J.R. 2014. A Textbook of Hydrology, University of Science Press.*

Course Name: **Human Geography**
Course Code: **GEOUGE02**
L+T+P: **4+0+2 per week**

Course Outcome:

By the time students complete this course they will be able to:

1. Explain the nature and scope of Human Geography.
2. Study of growth and distribution of population in world perspective.
3. Understand the concept and indicators of socio-economic development.
4. Know the population-resource relationship after Ackerman.
5. Study the concept of society, social groups and social processes.
6. Understand the concept and spatial distribution of caste, religion, race and gender.
7. Understand the cultural regions, cultural realms, cultural landscape, cultural hearth and cultural diffusion.
8. Measure the growth rate of population.
9. Apply and identify the cultural elements from toposheet (1:50,000).
10. Understand and measures of HDI and GDI and their inferences.

Unit I: Elements of Human Geography

1. Nature and Scope of Human Geography
2. Growth and Distribution of world population
3. Economic and social Development, Indicators of Socio-economic Development
4. Population-resource region after Ackerman

Unit II: Society and Culture

1. Concept of society and social groups; Social processes
2. Social categories: Caste, religion, race, gender, and their spatial distribution
3. Cultural regions and cultural realms, concept of Cultural landscape
4. Cultural hearth and Cultural Diffusion

Unit III: Human Geography (Practical)

1. Measuring growth rate of population
2. Identification of cultural elements from toposheet (1:50,000)
3. Measures of human development: HDI and GDI
4. Laboratory note book and viva voice

Text and Reference Books

- *Bergman, E.F (1995): Human Geography-Culture, Connections and Landscape, Prentice Hall, New Jersey*
- *Chisholm. (1975): Human Geography, Penguin Books, Hermondsworth.*
- *Daniel, P.A. and Hopkinson, M.F. (1989) The Geography of Settlement, Oliver & Boyd, London.*
- *Johnston R; Gregory D, Pratt G. et al. (2008) The Dictionary of Human Geography, Blackwell Publication.*
- *Jordan-Bychkov et al. (2006) The Human Mosaic: A Thematic Introduction to Cultural Geography. W. H. Freeman and Company, New York.*
- *Norton. W. (2001): Human Geography, 4th Edition Oxford University press, Oxford*
- *Pearce D. (1995): Tourism Today: A Geographical Analysis, 2nd edition, Longman Scientific & Technical, London*

- *Pickering K. and Owen A. A. (1997): An Introduction to Global Environmental Issues, 2nd Edition Rutledge, London.*
- *Raw, M. (1986): Understanding Human Geography: A Practical Approach, Bell and Hyman. London*
- *Rubenstein, J.M. (2002), The Cultural Landscape, 7th Edition, Prentice Hall, Englewood Cliffs*
- *Smith D M (1982): Human Geography: A Welfare Approach, Edward Arnold, London*

Course Name: **Economic Geography**
Course Code: **GEOUGE03**
L+T+P: **4+0+2 per week**

Course Outcome:

By the time students complete this course they will be able to:

1. Understand the concept, types and conservation of resources.
2. Study the sectors of the economy i.e. Primary and world economic order and their characteristics.
3. Explain the locational models in economic geography namely Von Thünen, Weber and Losch and their present day applicability.
4. Know the types of agriculture and agricultural regions of the world.
5. Discuss the industrial regions of the world and cotton, iron and steel, and IT industries with special reference to India.
6. Study the models of transport and it characteristics.
7. Understand the international agreements and trade blocs.
8. Determine and represent the spatial variation in occupational structure by proportional divided circles.
9. Measure and interpret the inequality of economic data with the help of Location Quotient
10. Measure and analyse the connectivity and accessibility with the help of Alpha, Beta, Gamma and Detour index

Unit I: Economic Geography-I

1. Concept of Resource; Types and conservation
2. Sectors of the economy: Primary, Secondary, Tertiary and Quaternary
3. World economic order and their characteristics
4. Location of economic activities: Theories of Von Thünen and Weber

Unit II: Economic Geography-II

1. Types of agriculture; Agricultural regions of the world
2. Industrial regions of the world; Industries with special reference to India: Cotton, Iron and Steel, and IT
3. Modes of Transport and their characteristics
4. International agreements and trade blocs: GATT and OPEC

Unit III: Economic Geography (Practical)

1. Spatial variation in occupational structure
2. Location Quotient
3. Connectivity and accessibility: Alpha, Beta, Gamma and Detour index
4. Laboratory note book and viva voice

Text and Reference Books

- *Alexander J. W., 1963: Economic Geography, Prentice-Hall Inc., Englewood Cliffs, New Jersey.*
- *Aoyama, Y., Murphy, J., and Hanson, S. (2010) Key Concepts in Economic Geography, London: Sage.*

- *Bagchi-Sen S. and Smith H. L., 2006: Economic Geography: Past, Present and Future, Taylor and Francis.*
- *Berry, B.J.L., Conklin, E.C. and Ray, M.D. (1976): The Geography of Economic Systems, Prentice Hall, New Jersey.*
- *Bradford, M.G. and Kent, W.A. (1977): Human Geography, Theories and Applications, Oxford University Press, Oxford.*
- *Coe, N., Kelly, P., and Yeung, H. (2007) Economic Geography: A Contemporary Introduction, London: John Wiley & Sons.*
- *Hodder B. W. and Lee Roger, 1974: Economic Geography, Taylor and Francis.*
- *Jones, C.F. and Darkenwald, G.G. (1954): Economic Geography, Macmillan, New York.*
- *Leong. G.C. and Morgan, G.C. (1975): Human and Economic Geography, Oxford University Press, Hong Kong.*
- *Morgan, W.B. and Munton, R.J.C. (1971): Agricultural Geography, Methuen, London.*
- *Singh, J. (1974): An Agricultural Atlas of India: A Geographical Analysis, Vishal Publications, Kurukshetra.*
- *Thomas, R.S. and Corbin, P.B. (1968): Geography of Economic Activity, McGraw Hill, New York.*

Course Name: **Cartography**
Course Code: **GEOUGE04**
L+T+P: **4+0+2 per week**

Course Outcome:

By the time students complete this course they will be able to:

1. Will learn fundamental concepts of cartography i.e. the technique of map making.
2. Learn to create base map along with integration, transformation and also enlargement and reduction of map.
3. Learn map science and art behind making maps and integration of spoatial data with point, line and area data.
4. Will learn many aspects of map design and map production. .
5. Will learn to prepare different cartogram to be integrated with the map to make more visually appealing and useful.
6. Select and correctly reference literature to equip them for project reports etc.
7. Make them employable for the contemporary job markets.
8. Develop to handle projects of their own from designing to implementation.

Unit I: Cartographic Techniques-I

1. Maps: Components and classification
2. Concept and application of scales: Plain, comparative, diagonal and Vernier
3. Coordinate systems: Polar and rectangular; Concept of generating globe
4. Grids: Angular and linear systems of measurement; Bearing: Magnetic and true, whole-circle and reduced

Unit II: Cartographic Techniques-II

1. Map projections: Classification, properties and uses; Concept and significance of UTM projection
2. Representation of data using dots and proportional circle
3. Representation of data using isopleth and choropleth
4. Survey of India topographical maps: Reference scheme of old and open series.

Unit III: Cartographic Techniques-III (Practical)

1. Graphical construction of scales: Plain, comparative, diagonal and Vernier
2. Construction of projections: Polar Zenithal Stereographic, Simple Conic with one standard parallel, Cylindrical Equal Area
3. Thematic maps: Pie diagrams with proportional circles, dots and spheres, Choropleth, and isopleth, maps
4. Viva-voce based on laboratory notebook

Text and Reference Books

- *Dent B. D., 1999: Cartography: Thematic Map Design, (Vol. 1), McGraw Hill.*
- *Gupta K. K and Tyagi V. C., 1992: Working with Maps, Survey of India, DST, New Delhi.*
- *Mishra R. P. and Ramesh A., 1989: Fundamentals of Cartography, Concept Publishing.*
- *Monkhouse, F.J., Wilkinson, H.R. 1971. Maps and Diagrams: Their Compilation and Construction, 3rd Ed (2017 reprint), Alphaneumera-Kolkata.*
- *Pearson II, F. 1990. Map Projections: Theory and Applications 2nd Ed, CRC Press.*
- *Robinson A., 1953: Elements of Cartography, John Wiley.*

- *Robinson, A.H., Morrison, J.L., Phillip, C.M., Kimerling, A.J., Guptill, S.C. 1995. Elements of Cartography, 6th Ed, Wiley.*
- *Sarkar, A. 2015. Practical Geography: A Systematic Approach, 3rd Ed, Orient Blackswan Private Ltd.*
- *Singh R. L. and Singh R. P. B., 1999: Elements of Practical Geography, Kalyani Publishers.*
- *Steers J. A., 1965: An Introduction to the Study of Map Projections, University of London.*