

Master of Science in Geography

Course Structure and Syllabus

1st to 4th Semester

Academic Session 2017-18



Centre for Geography and Geology

Central University of Punjab

Bathinda

Course Structure and Syllabus for M.A. Geography												
Course Code	Course Title	Credit Hours				% Weightage				E	CBCS	
		L	T	P	Cr	A	B	C	D			
Semester-I												
Core courses												
GEO.501	Geomorphology	4	1	-	4	25	25	25	25	100	Co	
GEO.502	Climatology	4	1	-	4	25	25	25	25	100	Co	
GEO.503	Oceanography	4	1	-	4	25	25	25	25	100	Co	
GEO.504	Biogeography	4	1	-	4	25	25	25	25	100	Co	
GEO.505	Computer applications - Practical	-	-	4	2	-	-	-	100	100	Fd	
GEO.506	Physical Geography Practical	-	-	4	2	-	-	-	100	100	Fd	
IDC												
IDC.	Interdisciplinary course from other discipline	2	-	-	2	25	25	25	25	100	EI	
Total		18	4	8	22	-	-	-	-	700		
Semester-II												
Core courses												
GEO.508	Economic Geography	4	1	-	4	25	25	25	25	100	Co	
GEO.509	Geography of India	4	1	-	4	25	25	25	25	100	Co	
GEO.510	Population & Settlement Geography	4	1		4	25	25	25	25	100	Co	
GEO.511	Cartography - Practical	-	-	4	2	-	-	-	100	100	Co	
GEO.599	Assignment Seminar	1	-	-	1	-	-	-	100	100	Co	
IDC												
IDC.	Interdisciplinary course from other discipline	2	-	-	2	25	25	25	25	100	EI	
Compulsory and interdisciplinary course for M.Sc.												

GEO.512	Soil Pollution and Management	4	1	-	4	25	25	25	25	100	Fd
GEO.513	Soil Pollution and Management - Practical	-	-	4	2	-	-	-	100	100	Fd
	Total	19	4	8	23	-	-	-	-	800	
Semester-III											
Core courses											
GEO.601	Geographical Thoughts	4	1	-	4	25	25	25	25	100	Co
GEO.602	Research Methodology in Geography	4	1	-	4	25	25	25	25	100	Co
GEO.603	Geographical Information System – (T)	4	1	-	4	25	25	25	25	100	Co
GEO.604	Geographical Information System – (P)	-	-	4	2	-	-	-	100	100	Co
GEO.605	Survey and Field visit -Practical	1	-	-	2	-	-	-	100	100	Co
GEO.699	Assignment Seminar	1	-	-	1	-	-	-	100	100	Co
Optional courses : Select any one from the followings:											
Group A											
GEO.621	Urban Geography	4	1	-	4	25	25	25	25	100	EI
GEO.622	Urban Geography - Practical	-	-	4	2	-	-	-	100	100	EI
Group B											
GEO.623	Photogrammetry	4	1	-	4	25	25	25	25	100	EI
GEO.634	Photogrammetry - Practical	-	-	4	2	-	-	-	100	100	EI
Group C											
GEO.625	Watershed management	4	1	-	4	25	25	25	25	100	EI
GEO.626	Watershed management - Practical	-	-	4	2	-	-	-	100	100	EI
Group D											
GEO.627	Geography of Forest	4	1	-	4	25	25	25	25	100	EI
GEO.628	Geography of Forest - Practical	-	-	4	2	-	-	-	100	100	EI
Group E											
GEO.629	Social and Demography Geography	4	1	-	4	25	25	25	25	100	EI

GEO.630	Social and Demography Geography - Practical	-	-	4	2	-	-	-	100	100	EI
Total		18	4	8	23	-	-	-	-	800	
Semester-IV											
Core courses											
GEO.606	Fundamentals of Remote Sensing-T	4	1	-	4	25	25	25	25	100	Co
GEO.607	Fundamentals of Remote Sensing-P	-	-	4	2	-	-	-	100	100	Co
GEO.700	Dissertation/Project work and Viva voce	-	-	-	10	-	-	-	-	-	Co
Elective courses: Select any one special group based on specialisation from the followings:											
Group A											
GEO.631	Geography of Disaster	4	1	-	4	25	25	25	25	100	EI
GEO.632	Geography of Disaster - Practical	-	-	4	2	-	-	-	100	100	EI
Group B											
GEO.633	Gender, Health and Development	4	1	-	4	25	25	25	25	100	EI
GEO.634	Gender, Health and Development -Practical	-	-	4	2	-	-	-	100	100	EI
Group C											
GEO.635	Digital Image Processing & Information Extraction	4	1	-	4	25	25	25	25	100	EI
GEO.636	Digital Image Processing & Information Extraction -Practical	-	-	4	2	-	-	-	100	100	EI
Total		8	2	8	22	-	-	-	-	400	
Grand total		L	T	P	Cr	A	B	C	D	E	CBSC
		63	14	32	90	-	-	-	-	2700	

A: Continuous Assessment: Based on Objective Type Tests

CBSC:Choice Based Credit System

B: Mid-Term Test-1: Based on Objective Type and Subjective Type Test C: Mid-Term Test-2: Based on Objective Type and Subjective Type Test D: End-Term Exam (Final): Based on Objective Type Tests E: Total Marks	Co: Core Course Fd: Foundation Course El: Elective Course
L: Lectures T: Tutorial P: Practical Cr: Credits	

Semester-I

Course Title: Geomorphology

L	T	P	Cr	Marks
4	1	-	4	100

Course Code: GEO.501

Course Description:

It introduces the basic concepts of geomorphology. It covers various geomorphic processes that would help in understanding different landforms on the earth's surface.

Unit I

(12 Lectures)

Fundamental Concepts in Geomorphology:

- Concept & fundamentals of geomorphology; Principles of uniformitarianism
- Doctrine of Isostasy - Views of Airy and Pratt
- Mountain Building Theories – concepts of Kober, Daly and Holmes.
- Concept of relief and relief features – mountains, plateaus, hills, foothills, valleys, plains and Floodplains.

Unit II:

(12 Lectures)

Earth Movements and Interior of the Earth

- Plate Tectonics and Continental drift theory.
- Earthquake and volcanism – seismology, plutonism
- Evolution of the earth and Earth's internal structure; composition and characteristics.

Unit III:

(16 Lectures)

Geomorphic Processes and landforms

- Cycle of Erosion - concepts of Davis and Penck
- Gradational and aggradational processes: concept of slope, erosion and mass wasting.
- Geomorphic landform: fluvial, glacial, Aeolian, coastal and karst.

Unit IV:

(16 Lectures)

Geology and Pedology

- Weathering: Physical and chemical Process
- Rocks: types, formation and characteristics
- Soil: types, formation and characteristics

Suggested readings:

1. Thornbury, W.D. (1969) Principles of Geomorphology, New York: John Wiley and Sons. 2nd edition, December 2004.
2. Singh, Savindra (1998). Geomorphology, Allahabad: Prayag Pustak Bhawan.

Additional readings:

1. Bloom, Arthur L., *Geomorphology: A Systematic Analysis of Late Cainozoic Landforms*, Pearson Education, Singapore, 3rd Edition, 2003.
2. Bloom, A.L. (1979) *Geomorphology*, New Delhi: Prentice Hall of India Pvt. Ltd.
3. Chorley, R.J., et.al. (1984): *Geomorphology*, John Wiley and Sons, New York.
4. Cooke, R.V. and Doornkomp, J.C. (1974): *Geomorphology in Environment Management – An Introduction*, Clarendon Press, Oxford.
5. Davis, W. M. (1909). *Geographical Essays*, Dover, Boston.
6. Embleton, C. and King, C.A.M. (1975). *Glacial Geomorphology*, London: Edward Arnold.
7. Fairbridge, R.W. (1968). *Encyclopedia of Geomorphology*, New York: Reinholds.
8. Gondie, S.A. (2004) (Eds). *Encyclopedia of Geomorphology*, Routledge, London.
9. Hart, M.G. (1986). *Geomorphology, Pure and Applied*, George Allen and Unwin, London.
10. Hails, J.R. (1977). *Applied Geomorphology*, Elsevier, Amsterdam
Morisawa, M (1968) *Streams*, New York: McGraw Hill.
11. Pitty, A.F. (1982) *The Nature of Geomorphology*, New York: Methuen.
12. Rice, R.J. (1990). *Fundamentals of Geomorphology*, London: ELBSL.
13. Schumn, S. (1977). *The Fluvial System*, New York: John Wiley and Sons.
14. Small, R.J. (1978). *The Study of Landforms*, Cambridge: Cambridge University.
15. Sparks, B.W. (1972): *Geomorphology*, Longman Group Ltd.
16. Steers, J.A. (1937) *The Unstable Earth*, Methuen and Co., Ltd, London.
17. Strahler, A.N. (1992) *Physical Geography*, New York: John Wiley and Sons.
Strahler, Alan and Arthur Strahler. (1996). *Physical Geography: Science and Systems of the Human Environment*, John Wiley & Sons, New York, 3rd Edition, 2005.

Course Title: Climatology**Course Code:** GEO.502

L	T	P	Cr	Marks
4	1	-	4	100

Course Description:

It introduces the basic concepts of climatology. The paper covers understanding the atmospheric condition and various agents affecting the earth surface. It includes applied climatology that would study inter relationship of man and climate.

Unit I (12 Lectures)

- Nature and Scope of Climatology
- Earth's Atmosphere: Evolution, Structure and Composition.

Unit II: (14 Lectures)

- Solar radiation and Terrestrial radiation; Variation, distribution and effect on atmosphere
- Greenhouse effect and global heat budget
- Temperature: Concept, measurement, scales, daily and annual cycles of temperature; vertical distribution; world distribution.

Unit III: (14 Lectures)

- Cloud: Type and formation and relation to hydrological cycle
- Atmospheric moisture and precipitation: Concept and measurement of atmospheric moisture; condensation - forms of condensation; adiabatic temperature changes, formation and types of precipitation; global distribution of precipitation.

Unit IV: (16 Lectures)

- Wind circulation Models of general circulation of the atmosphere: Jet stream, Air masses and fronts, characteristics, movements, frontogenesis.
- Tropical cyclones; mechanism and characteristics
- Classification of climates: Empirical and generic, Climatic classification with special reference to Koppen and Thornthwaite.

Suggested readings:

1. Savindra Singh (2005). 'Climatology', Prayag Pustak Bhavan, Allahabad.
2. Lal, D.S. (1998). 'Climatology', Chaitanya Publishing House, Allahabad.

Additional readings:

1. Barry, G.G. and Chorley. (1976). Atmosphere, Weather and Climate, Methuen and Co., London.
2. Barret, E.C. (1974). Climatology from Satellites, Methuen London.
3. Critchfield, H.F., (1987). General Climatology, Prentice-Hall of India Pvt. Ltd., New Delhi.
4. Lowa Lutgens, Federic K. & Tarbuck Edward J (1995). 'The Atmosphere: An Introduction to Meteorology', Prentice Hall, New Jersey.
5. Thompson, R.D. and Allen, P. (1997). 'Applied Climatology: Principles and Practice', Routledge, London and New York.
6. Oliver, John E. (1973). 'Climate and Mans Environment: An Introduction to Applied Climatology', John Wiley & Sons, New York, London.
Mather, J.R. (1974). 'Climatology: Fundamentals and Applications', McGraw-Hill, New York.

Course Title: Oceanography

L	T	P	Cr	Marks
4	1	-	4	100

Course Code: GEO.503**Course description:**

The course introduces to the study of oceans. As continents are surrounded by oceans, understanding of oceans would help in understanding natural phenomena.

Unit I (14 lectures)

- Nature and Scope of Oceanography;
- Major features of Ocean basins and ocean deposits
- Bottom relief of Indian, Atlantic and Pacific Oceans.

Unit II: (14 lectures)

- Physical and chemical properties of sea water, sources and factors affecting the distribution of temperature and salinity.
- Circulation patterns in the ocean – ocean currents, water masses, waves, tides and tsunamis, their types and theories of origin.

Unit III: (14 lectures)

- Marine biological environment, bio zones – Plankton, Nekton and Benthos
- Coral reef; types, characteristics and theories of origin.

Unit IV: (14 lectures)

- Ocean resource and their influence on human activity
- Impacts of Humans on the Marine Environment – Laws of the sea, marine resources, pollution, EEZ (exclusive Economic Zone).

Suggested readings:

1. Davis Richard, J.A. (1986). Oceanography – An Introduction to Marine Environment, Wm. C. Brown, Iowa.
2. David Ross (1973). Introduction to Oceanography.
3. Duxbury, C.A. and Duxbury, B. (1996): An Introduction to World's Oceans, C.Brown Iowa (2nd Ed.).
4. Garrison, T. (2001). Oceanography – An Introduction to Marine Science, Books/Cole, Pacific Grove, USA.
5. Gross M.Grant (1987). Oceanography – A view of the Earth, Prentice Hall Inc. New Jersey.
6. Singh Savindra (20). Oceanography, Allahabad.
7. Ummerkutty, A.N.P. (1985). Science of the Oceans and Human Life, National Book Trust, New Delhi.

Course Title: Biogeography

L	T	P	Cr	Marks
4	1	-	4	100

Course Code: GEO.504**Course Description:**

The course focuses on ecological factors that shape the distribution of organisms and their changes over time and provides geographical and historical background for the field of biogeography. It also highlights biogeographical consequences of global change like climate change.

Unit I (15 Lectures)

- Nature, scope and significance of Biogeography
- Spatial dimension in biogeography; pattern of plant and animal distributions,
- Bio-geographical regions and realms.
- Biodiversity: depletion and conservation.

Unit II: (15 Lectures)

- Ecology and Ecosystem; significance in biogeography;
- Basic ecological principles; Geo-biochemical cycles: carbon, nitrogen, oxygen and phosphorus cycles;
- Biome and biomass;

Unit III: (11 Lectures)

- Biogeography of the seas; island biogeography. Habitat fragmentation; biogeography of linear landscape features.

Unit IV: (15 Lectures)

- Biogeographical information, collection, retrieval and application.
- Projecting into the future: Climate change; biogeographical consequences of global change; changing communities and biomes; effect of climate change on biological diversity.

Suggested readings:

1. Brown, J. H., & A. C. Gibson, Biogeography, St. Louis, Mosby, 1983.
2. Brown, J.H. and Lomolino, M.V., Biogeography, Second Edition, Sinauer Associates, Inc. Sunderland, Massachusetts, 1998.
3. Cox, C.B., Moore, P.D., Biogeography, An Ecological and Evolutionary Approach, 5th ed., Blackwell Science, Cambridge, 1993.
4. MacDonald, Glen, Biogeography: Introduction to Space, Time and Life, John Wiley, New York, 2002.
5. Robinson, H., Biogeography, The English Language Book Society and Macdonald and Evans, London, 1982.

Additional readings:

1. Spellerberg, Ian F. and John, W.D. Sawyer, An Introduction to Applied Biogeography, Cambridge University Press, Cambridge, 1999.
2. Tivy, Joy, Biogeography, A Study of Plants in the Ecosphere, Longman Scientific & Technical, UK, 1993.
3. Tivy, Joy and Greg O'Hare, Human Impact on the Ecosystem, Oliver & Boyd, Edinburgh, 1981

Course Title: Computer applications - Practical

L	T	P	Cr	Marks
2	-	-	2	100

Course Code: GEO.505**Course description:**

This paper outlined general concepts on computer and statistics for the student. The course design would benefit the student in computer and statistics requirement in other papers.

Unit I

- **Fundamentals of computers:** Parts of computers, Hardware, BIOS, Operating systems, Binary system, Logic gates and Boolean Algebra.
- **Application software:** Spreadsheet applications, Word-processing applications, Presentation applications, Internet browsers, Reference Management, and Image processing applications.

Unit II:

- **Computer Language:** Basic DOS commands, AutoHotKey scripting language, HTML and basic structure of a webpage, Designing websites.
- **World Wide Web:** Origin and concepts, Latency and bandwidth, Searching the internet, Advanced web-search using Boolean logic, Cloud computing.

Suggested readings:

1. Bhatt, Pramod Chandra P. An Introduction to Operating Systems: Concepts and Practice. Second edition, New Delhi: PHI Learning Pvt. Ltd., 2008.
2. Burt J.E. Barber. G.E. Rigby D.L. (2009). Elementary Statistics for Geographers, Guilford Press, New York.
3. Date, C. J. An Introduction to Database Systems. Massachusetts: Addison-Wesley
4. Longman, 7th Edition, 2000.
5. David, Cyganski, John A. Orrand R.F. Vaz. Information Technology: Inside and Outside. New Jersey: Prentice Hall, 2000.

Course Title: Physical Geography Practical

L	T	P	Cr	Marks
-	-	2	4	100

Course Code: GEO.506

Course Description:

Unit I: Geomorphology

- Relief representation through serial profiles, superimposed profiles, composite profiles and projected profiles
- Preparation of Relative Relief Map using Smith's Method from Topographical Maps
- Drawing and analysis of Average Slope Map by Wentworth's Method
- Identification of rocks and listing of their characteristics (sandstone, shale, limestone, coal, breccias and conglomerate, granite, pragmatite, syenite, diorite, grabbro, periodolite)

Unit II: Climatology

- Construction of a schematic diagram of the vertical layers of earth's atmosphere and tabulation of compositional characteristics
- Drawing of climograph and hythergraph and their interpretation
- Study of weather condition depicted by Indian Weather maps and prediction of weather conditions for next 48 hours
- Calculation of average annual rainfall and variability of annual rainfall, and mapping and interpretation thereof

Unit III: Oceanography

- Drawing and interpretation of Hypsometric/ hypsographic curves of ocean bottom
- Bathymetric curves of Atlantic and Indian Oceans
- Ocean currents on a Mercator's Chart
- Major sea ports on a world map
- Bottom relief features of Indian and Atlantic ocean

Unit IV: Bio-geography

- Identification of soil and reading PH-value
- Mapping and interpretation of soil and vegetation of India
- Mapping of the national parks and sanctuaries of India with the major species therein.

Semester 2

Course Title: Economic Geography

L	T	P	Cr	Marks
4	1	-	4	100

Course Code: GEO.508

Course description:

Understanding economic activities of man is the basic elements of economic geography. The course introduces various economic theories that will help in understanding economic activities and its location.

Unit I (14 Lectures)

- **Economic Geography:** Nature and scope;
- Approaches in economic geography: regional, systematic and sectoral

Unit II: (14 Lectures)

- **Resources:** Significance of Natural and Human resources in Economic Development;
- Economic Development: Measures of economic development: Rostow's and Myrdal's models;
- **Factors of Production:** Significance of land, labor and capital in different economic activities,
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Unit III: (14 Lectures)

- **Agricultural Patterns-**Technology, modernization and structuring of agrarian regions: precolonial, colonial and neo-colonial; Agricultural land-use models critical review- Contemporary perspective; Crisis of agriculture- Aspects of Food security and world patterns of hunger.

Unit IV: (14 Lectures)

- Agriculture and industrial location: Von Thunen and Weber's models.

Suggested readings:

1. Bryson, J., et. al. (1999). The Economic Geography Reader, John Wiley, Chichester.
2. Chakraborty, S. and Somik V. (2007). Made in India : The Economic Geography and Political Economy of Industrialization, Oxford, New Delhi.
3. Clark, G., et. al. (2000). The Oxford Handbook of Economic Geography, Oxford, New York.
4. Dodson, R.A. (1998). Society in Time and Space, Cambridge University Press, Cambridge.
5. Grossman, G. (1984). Economic Systems, Prentice Hall, New Jersey.
6. Hanink, D. M. (1997). Principles and Applications of Economic Geography, John Wiley, New York.
7. Hartshorn, Truman, A. and John W. A. (1994). Economic Geography, 3rd Edition, Prentice Hall of India Pvt. Ltd., New Delhi.
8. Knox, P. and Agnew, J. (1998). The Geography of the World Economy, 3rd Edition, Arnold, London.

Course Title: Geography of India

L	T	P	Cr	Marks
4	1	-	4	100

Course Code: GEO.509**Course description:**

India is a vast country with diversity physically as well as ethnically. The course would help in understanding India and its geographical entity for students.

Unit I

(14 Lectures)

- Geological history of India
- Relief feature: Physiographic divisions and its formation
- Drainage systems; watershed and basin

Unit II:

(14 Lectures)

- Climate of India: types and Mechanism of monsoon
- Indian forest: types and characteristics
- Mineral resources: types and belt

Unit III:

(14 Lectures)

- Agriculture: Salient features of agriculture, agricultural regions, major crops,
- Agricultural revolution: green revolution, white, blue and yellow revolutions.
- Industry: Industrial belt of India: Locational factors of cotton, jute, textile, iron and steel, aluminium, fertilizer, paper, chemical and pharmaceutical, automobile, cottage and agro-based industries;
- New industrial policies; Multinationals and liberalization;
- Special Economic Zones;

Unit IV:

(14 Lectures)

- Social and environmental challenges in India: Regional disparities in the levels of economic development, distribution of population growth and policies
- Flood and drought problem; management

Suggested readings:

1. Deshpande, C.D. (1992). India: A Regional Interpretation, ICSSR & Northern Book Centre, New Delhi.
2. Dutt, Ashok K. (Ed.) (1972). Indian – Resources, Potentialities and Planning, Kendall/Hunt Publishing Company, Dubuque.
3. Government of India (2007). National School Atlas, NATMO, Kolkatta.
4. Gautam, A. (2006). Advance Geography of India, Sharda Pustak Bhawan, Allahabad.
5. India. (2013). A Reference Annual: Ministry of Information & Broadcasting, GOI, New Delhi.
6. Khullar D.R. (2005). India-A comprehensive geography, Kalyani Publishers, Ludhiana.
7. Nagi P. and Smita Sen Gupta (1993). Geography of India, Concept Publishing Company, New Delhi.
8. Ramesh A. (Ed.) (1981). Resource Geography, Heritage Publishers, New Delhi.
9. Tiwari, R.C. (2006). Geography of India, Prayag Pustak Bhavan, Allahabad.
10. Wadia, D.N. (1953). Minerals of India, National Book Trust, New Delhi.

Course Title: Population & Settlement Geography**Course Code:** GEO.510

L	T	P	Cr	Marks
4	1	-	4	100

Course Description:

The course introduces population concepts and their importance. It explains how human population is distributed over earth surface and interacts with developmental process.

Unit I (14 Lectures)

- **Population geography:** Concepts, scope and methodology; Data sources;
- Population dynamics: fertility and mortality
- Concepts of ageing: young, stationary and stable population.

Unit II: (14 Lectures)

- **Migration:** Concepts and pattern; types of migration and theories
- Concept of mobility and migration, sources and quality of data, census definition of migrants and its limitations;
- Concepts of population projections and interpolation & extrapolation
- Millennium development goals and achievements with special reference to India.

Unit III: (14 Lectures)

- **Settlement Geography:** Nature, scope and significance, concept of Site and situation.
- Types of settlement: Clustered and dispersed.

Unit IV: (14 Lectures)

- **Rural Settlements:** Definition and characteristics; Types and materials of farm fencing; Folk housing and folk architecture; Traditional building materials.
- **Urban Settlements:** Definition and characteristics; Theory of Christaller; Functional classification of urban centres; Harris and Nelson; Morphological characteristics of urban settlements; Theories explaining internal structure of cities: Sector, concentric zone and multiple-nuclei.

Suggested readings:

1. Ahmad, E. 1979. Social and Geographical Aspects of Geography of Human Settlements. New Delhi: Classical Publications.
 2. Ambrose, P. 1970. Concepts in Geography; Settlement Patterns. London: Longmans.
 3. Census of India, 1961. House Types and Settlement Patterns of Villages in India. New Delhi.
 4. Chisholm, M. 1969. Rural Settlements and Land Use. London: Hutchinson.
 5. Christaller, C. W. 1966. Central Places in Southern Germany. Englewood Cliffs N. J: Prentice Hall.
 6. Clout, H. D. 1972. Rural Geography: Introductory Survey. Oxford: Pergamon.
 7. Chisholm, M. (1962). Rural Settlements and Landuse, Hutchinson, London.
 8. Ehrlich, P.R. and Ehrlich, A.H. (1996). Ecoscience: Population, Resources, Environment. 6th ed. W.H. Freeman and Company, San Francisco.
 9. Herbert David & C.J. Thomas (1982). Urban Geography – A First Approach, John Wiley & Sons, Binghamton, N.Y.
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Course Title: Cartography - Practical

L	T	P	Cr	Marks
-	-	2	4	100

Course Code: GEO.511

Course Description:

Unit I: Map reading

- Map Scale: horizontal and vertical, vertical exaggeration
- Scale and Cognitive Maps; Common Scales
- Scale factor: Enlargement and reduction of Maps
- Reading and Analysis of Topographical Maps of 1:50,000 scale
- Preparation of Thematic Map/and Generation of Data from the topographical maps (land use map and area under different land-use categories)
- Construction of Transect Chart showing the relationship among Relief, Drainage, Vegetation, Settlements, Agriculture and Transport Network

Unit II: Map Projection

- Conventional Map Projection -
- Sinusoidal projection,
- Mollweide's Projection,
- UTM projection.

Unit III: Mapping of socio-economic data

- Choropleth mapping by grouping the data following Natural Break, Equal interval and Standard Deviation method (Density of population/Land Use/Cropping pattern)
- Pie-graph for representation of land use, cropping pattern, rural-urban composition, etc.
- Cartographic representation of economic data: pie-graph, Age-sex pyramid, line graph, bar graph and choropleth mapping
- Transport network analysis using connectivity indices (alpha, beta & gamma).

Suggested readings:

1. Keates, J.S. (1998). Cartographic Design and Production, Longman, London.
2. Lawrence. G.R.P, 1971 : Cartographic Methods, Methuen , London.

Additional Readings:

3. Misra, R.P. and Ramesh, A. (1989). Fundamental of Cartography, Concept Publishing Company, New Delhi.
4. Monkhouse, F.J. (1994). Maps and Diagrams, Methuen and Co., London.
5. Robinson, A.H. et al. (1992). Elements of Cartography, John Willy & Sons, New York, 6th edition.
6. Ramamurthy, K. (1982). Maps Interpretation: India Landscapes through Survey of India, Topographic Maps, R.K. Mutt Road, Madras.
7. Wood Clifford H. and Keller C. (1996). Cartographic Design- Theoretical and Practical Perspectives, John Wiley & Sons.

Compulsory and interdisciplinary course for M.Sc.

Course Title: Soil Pollution and Management

L	T	P	Cr	Marks
4	1	-	4	100

Course Code: GEO 512

Unit I (16 Lectures)

Soil formation

Definition, rocks, minerals, soil forming factors, soil weathering- types and processes, soil formation, soil horizon, soil profiles, composition of soil, soil biota and their function in soil, humus, Soil microbes in nutrient cycling, Soil types in India. Physico-chemical and biological properties of soil, sampling and analysis of soil quality.

Unit II: (14 Lectures)

Soil pollution

Definition, sources- point and non- point, soil pollutants – types and characteristics, routes. Soil pollutants – Types, pesticides – classification, formulation; residual toxicity, synthetic fertilizers, heavy metals, Industrial waste effluents and interaction with soil components. Effects and impacts of soil pollution, biomagnification. Thermal pollution – sources and impacts.

Unit III: (14 Lectures)

Soil erosion

Salt affected soil – Saline soils, Sodic soil, Usar, Kallar, Types of erosion – water and wind erosion, causes, soil loss equation. Land degradation – causes and impacts, types of waste lands in India, desertification and its Control.

Unit IV: (12 Lectures)

Soil management

Methodologies for soil conservation, conservation of arable land, techniques of reclamation and restoration of soil, wasteland reclamation, soil salinity management, remedial measures for soil pollution, bioremediation- in situ, ex situ, phytoremediation and biodegradation. Principles of weed management, Legal measures for land conservation at national and international level.

Suggested readings:

1. Botkin, Daniel B. and Keller, Edward A. Environmental Science: Earth as a Living Planet. 6th ed. John Wiley & Sons, USA. 2007.
2. Cunningham, W. P. and Cunningham, M. A. Principles of Environment Science. Enquiry and Applications. 2nd ed. Tata McGraw Hill, New Delhi. 2004.
3. Cutler, S.L, Environment Risks and Hazard. Prentice Hall of India, Delhi. 1999.
4. De, A.K., Environmental Chemistry. New Age International (P) Ltd. Publishers, New Delhi. 2000.
5. Hillel, D., Introduction to Soil Physics, Academic Press, New York. 1982.
6. Kapoor, B.S. Environmental Sanitation. S. Chand & Sons, New Delhi. . 2000.
7. Raven, Peter H., Berg, Linda R. and Hassenzahl, David M. Environment. 6th ed. John Wiley & Sons., USA. 2008.
8. Sanai, V.S. Fundamentals of Soil. Kalayani Publishers, New Delhi. 1990.
9. Sharma, B.K. Environmental Chemistry, Goel Publishing House, Meerut. 2000.
10. Sharma, P.D. Ecology and Environment, Rastogi Publications, New Delhi. 1997.

11. Singh, H.P., Batish, D.R. and Kohli, R.K. Handbook of Sustainable Weed Management. Haworth Press, Inc., USA. 2006.
12. Singh, R.A. Soil Physical Analysis, Kalayani Publishers, New Delhi. 1997.

Course Title: Soil Pollution and Management - Practical

L	T	P	Cr	Marks
-	-	4	2	100

Course Code: GEO.513

Unit I (14 Lectures)

- Determination of pH of water/soil sample.
- Determination of conductivity/TDS of the water sample.
- Determination of salinity of the soil sample.
- Determination of Total Organic Content.
- Determination of Total Kjeldahl Nitrogen (TKN), ammonical nitrogen etc. in soil samples.

Unit II: (14 Lectures)

- Determination of fluoride content in soil.
- Determination of bacterial population in soil samples by serial dilution and spread plate methods.
- Soil sieve analysis
- Standardization and use of Flame Photometer.
- Detection of heavy metal elements using Atomic absorption spectrophotometer.

Semester 3

Course Title: Evolution of Geographical Thought

L	T	P	Cr	Marks
4	1	-	4	100

Course Code: GEO.601

Course Description:

It introduces to life and works of various geographers and explains the development of geography as a discipline.

Unit I

(12 lectures)

Basic Concepts: The field of Geography, its place in the classification of Sciences; Geography as a social science and natural science. **Evolution of Geographic Thought:** Changing paradigms – Environmentalism, Possibilism, areal differentiation, spatial organisation.

Unit II:

(16 lectures)

Concept of region, **Philosophical debates in Contemporary Geography:** Critical understanding of positivism, behaviouralism, realism, Marxism, Structuralism, post-structuralism and postmodernism.

Unit III:

(16 lectures)

Methods in Geographical Analysis: Epistemology of geography, critical assessment and debates on quantitative, qualitative, field and cartographic methods in geography. Exceptionalism and the Schaefer-Hartshorne debate. Feminist geography.

Unit IV:

(12 lectures)

Future of Geography: changing nature, concepts, approaches and methodologies of geography in a Globalising World. Progress and Contributions in Indian Geography.

Suggested readings:

1. Dikshit, R. D. (2004): Geographical Thought. A Critical History of Ideas. Prentice-Hall of India, New Delhi.

Additional reading:

1. Adams, P., Steven, H. and Karel, T. (eds.) (2001): Texture of Place. Exploring Humanistic Geographies. University of Minnesota Press, Minneapolis.
2. Anderson, K., Domosh, M., Pile, S. and Thrift, N. (eds.) (2003): Handbook of Cultural Geography. Sage Publications, London.
3. Barnes, T. and Gregory, D. (eds.) (1997): Readings in Human Geography: The Poetics and Politics of Inquiry. Arnold, London.
4. Daniels, P., Bradshaw, M., Shaw, D. and Sidaway, J. (2000): An Introduction to Human Geography. Issues for the 21st Century. Prentice Hall, London.
5. Dear, M. J. and Flusty, S. (2002): The Spaces of Postmodernity: Readings in Human Geography. Blackwell Publishers, Oxford.
6. Doel, M. (1999): Poststructuralist Geographies. The Diabolical Art of Spatial Science. Edinburgh

University Press, Edinburgh

7. Gaile, G. and Wilmott, C. (eds.) (2003): *Geography in America at the Dawn of the 21st Century*. Oxford University Press, Oxford and New York.
8. Hartshorne (1939). *The Nature of Geography*. Association of American Geographers Lancaster Pennsylvania.
9. Hartshorne (1959). *Perspective on the Nature of Geography* Rand McNally and company Chicago.
10. Harvey, D. (1969): *Explanation in Geography*. Arnold, London.
11. Harvey, M. E. and Holly, P.B. (2002): *Themes in Geographic Thought*. Rawat Publications., Jaipur and New Delhi.
12. Hubbard, P., Kitchin, R., Bartley, B. and Fuller, D. (2002): *Thinking Geographically: Space, Theory and Contemporary Human Geography*. Continuum, London.
13. Johnston, R, Gregory D, Pratt G, Watts M. and Whatmore S. (2003): *The Dictionary of Human Geography*. Blackwell Publishers, Oxford. 5th edition.
14. Johnston, R.J. (1985): *The Future of Geography*, Methuen and Company Ltd., New York. (2003 edition published).
15. Johnston, R.J. and Sidaway, J.D. (2004): *Geography and Geographers*. 6th edition, Edward Arnold, London.
16. Kapur, A. (ed.) (2001): *Indian Geography – Voice of Concern*. Concept Publishing. Company, New Delhi.
17. Martin, G. (2005): *All Possible Worlds. A History of Geographical Ideas*. 4th edition, Oxford University Press, New York.
18. Mathews, J. A. and Herbert, D. T. (eds.) (2004): *Unifying Geography. Common Heritage, Shared Future*. Routledge, London.
19. Peet, R. (1998): *Modern Geographical Thought*. Blackwell Publishers Inc, Massachusetts.
20. Sack, R. D. (ed.) (2002): *Progress. Geographical Essays*. John Hopkins University Press, Baltimore.
21. Sauer, C. O. (1963): *Land and Life*. University of California Press, Berkeley.
22. Singh, R. L. and Singh, Rana P.B. (eds.) (1990): *Literature and Humanistic Geography*. National Geographical Society of India, BHU, Varanasi, Publication number 37
23. Singh, R. L. and Singh, Rana P.B. (eds.) (1992): *The Roots of Indian Geography: Search and*
24. Singh, Rana P.B. (ed.) (1993): *Environmental Ethics*. National Geographical. Society of India, BHU, Varanasi, Publication number 40.
25. Singh, Rana P.B. (ed.) (1994): *The Spirit and Power of Place*. National Geographical Society of India, BHU, Varanasi, Publication number 41.
26. Singh, Rana P. B. (2004): *Cultural Landscapes and the Lifeworld*. Indica Books, Varanasi.
27. Soja, E. (1989): *Post-modern Geographies*. Verso Press, London. Reprinted 1997: Rawat Publications, Jaipur and New Delhi.
28. Taylor, G. (ed.) (1953): *Geography in the Twentieth Century*. Methuen and Company Ltd. and Company, London.
29. Tuan, Yi-Fu (1977): *Space and Place. The Perspective of Experience*. Edward Arnold, London.
30. Singh, Ravi S (ed.) 2009. *Indian Geography: Perspectives, Concerns and Issues*. Jaipur/New Delhi: Rawat Publications.

Course Title: Research Methodology in Geography and synopsis writing

L	T	P	Cr	Marks
4	-	-	4	100

Course Code: GEO.602

Course Description:

The course will make the students aware about types, approaches and methods of research in geography and orient the students to design and prepare geographic research proposal, with emphasis on problem identification, methodology design and literature review.

Unit I (12 Lectures)

Introduction to research in Geography: Concept and significance of research in geography; Philosophy and methods; Naturalism and anti-naturalism; realism and idealism, Critical thinking.

Research and Academic Integrity: Copyright issues, Conduct of ethical research, Belmont report and Plagiarism in research.

Unit II: (12 Lectures)

Scientific Research; Inductive and deductive approaches; Research design; Formulation of research problem; Development and testing of hypothesis; Techniques of data collection; Sampling and field survey.

Unit III: (16 Lectures)

Data Analysis, interpretation and report writing: Data classification and tabulation; Data analysis and interpretation; reference writing; APA, MLA, Chicago. Plagiarism and research ethics.

Unit IV: (16 Lectures)

Writing thesis, project report and research paper; Synopsis writing: procedure, content, methods, literature review.

Suggested readings:

1. Blackburn, J. and Holland, J. (eds.) (1998): Who Changes? Institutionalising Participation in Development. IT Publications, London.
2. Blaxter, L.; Hughes, C. and Tight, M. (1996): How to Research. Open University Press, Buckingham.
3. Crang, Mike 1999. Cultural Geography. Routledge, London.
4. Daniels, P., Bradshaw, M., et al. (2000): Human Geography: Issues for the 21st Century. Prentice Hall, London, and Pearson Publishers., Singapore. Indian reprint, 2003.
5. Denzin, N. K. and Lincoln, Y.S., (eds.) (2000): Handbook of Qualitative Research. Thousand Oaks CA. Sage Publications.

Additional readings:

1. Dikshit, R. D. (2003): The Art and Science of Geography: Integrated Readings. Prentice-Hall of India, New Delhi.
2. Dorling, D. and Simpson, L. (eds.) (1999): Statistics in Society. Edward Arnold, London.
3. Fisher, P. and Unwin, D., (eds.) (2002): Virtual Reality in Geography. Taylor and Francis, London.
4. Flowerdew, R. and Martin, D. (eds.) (1997): Methods in Human Geography. A Guide for

Students Doing a Research Project. Longman, Harlow.

5. Hay, I. (ed.) (2000): *Qualitative Research Methods in Human Geography*. Oxford University Press, New York.
6. Henn, M., Mark W., and Nick F. (2006): *A Short Introduction to Social Research*, Vistaar Publications, New Delhi
7. Eyles J. and Smith D. M. (1988): *Qualitative Methods in Human Geography*, Polity Press, Dales Brewer Cambridge.
8. Kitchin, R. and Tate, N., (2001): *Conducting Research into Human Geography. Theory, Methodology and Practice*. Prentice-Hall, London.
9. Kitchin, R. and Fuller, D., (2003): *The Academic's Guide to Publishing*, Vistaar Publications, New Delhi
10. Limb, M. (2001): *Qualitative Methodologies for Geographers. Issue and Debates*. Edward Arnold, London.
11. Lofland, J. and Lofland, L.H. (1995): *Analysing Social Setting. A Guide to Qualitative Observation and Analysis*. Wadsworth, Belmont, CA.
12. Longley, P., Goodchild, M.F., Maguire, D. and Rhind, D. (1999): *Geographic Information Systems. Principles, Techniques, Management, Applications*. John Wiley and Sons, New York.
13. Maso, I., Atkinson, P.A. Delamont, S. and Verhoeven, J.C. (eds.) (1995): *Openness in Research. The Tension between Self and Other*. Van Gorcum, Assen, Netherlands.
14. Mikkelsen, B. (2005): *Methods for Development Work and Research: A New Guide for Practitioners*. Sage Publications, London.
15. Mukherjee, N. (1993): *Participatory Rural Appraisal: Methodology and Application*. Concept Publishing Company, New Delhi.
16. Mukherjee, N. (2002): *Participatory Learning and Action: with 100 Field Methods*. Concept Publishing Company, New Delhi.
17. O' Leary, Z. (2005): *The Essential Guide in Doing Research*, Vistaar Publications, New Delhi
18. Pacione, M., (ed.) (1999): *Applied Geography: Principle and Practice*. Routledge, London.
19. Parsons, T. and Knight, P. G., (1995): *How to Do Your Dissertation in Geography and Related Disciplines*. Chapman and Hall, London.
20. Patrick M. and Chapman S. (1990): *Research Methods(Third Edition)*, Routledge, London
21. Rachel, P. et al. (2001): *Introducing Social Geographies*. Arnold Hodder Group, London, and Oxford University Press, Oxford.

Course Title: Geographical Information System-(T)

L	T	P	Cr	Marks
4	1	-	4	100

Course Code: GEO.603**Course Description:**

The course introduces students to the fundamentals of GIS, GPS, data models, data sources, databases and Global Positioning Systems (GPS) and geospatial metadata. It prepares the candidate for the geospatial analysis.

Unit I

(13 Lectures)

Concept and definition of GIS, History and development of GIS technology, applications of GIS in various sectors (case study examples); GIS database (types, structures) and data model; Data input: spatial and non-spatial; Scanning and Digitizing; Data import and export.

Unit II:

(15 Lectures)

Geographic information and spatial data types (map, attributes, image data); Data processing systems (inputs and output devices); Data entry and preparations (inputs, editing and attributing); Geo-referencing; linking spatial and non-spatial data; Attribute handling. Functional Elements: Data Acquisition and Topology Creation; Data Management and Structure.

Unit III:

(12 Lectures)

Spatial analysis: overlay, buffer and proximity, network analysis; Creation of digital elevation models (DEM): contours and spot heights; Determination of slope, aspect and hill shading; Data interpolation: point and line data; Output generation and layouts.

Unit IV:

(16 Lectures)

Introduction to GPS, history of positioning system; Segments of GPS; GPS Applications. User interface with global positioning receivers; GNSS and types (NAVSTAR, GLONASS, GALILEO) introduction to DGPS, wide area augmentation system (WAAS); Collection of ground control points using hand held GPS receiver.

Suggested readings:

1. Bonham, Carter G.F. (1995): Information Systems for Geoscientists – Modelling with GIS. Pergamon, Oxford.
2. Burrough, P.A. and McDonnell, R. (1998): Principles of Geographic Information Systems. Oxford University Press, Oxford.
3. Chang, K.T. (2003): Introduction to Geographic Information Systems. Tata McGraw Hill Publications Company, New Delhi.
4. Chauniyal, D. D. (2004): Remote Sensing and Geographic Information Systems. (in Hindi). Sharda Pustak Bhawan, Allahabad.
5. Demers, M. N. (2000): Fundamentals of Geographic Information Systems. John Wiley and Sons, Singapore.

Additional readings:

1. ESRI (1993): Understanding GIS. Redlands, USA
2. Fraser Taylor, D.R. (1991): Geographic Information Systems. Pergamon Press, Oxford.
3. George, J. (2003): Fundamentals of Remote Sensing. Universities Press Private Ltd, Hyderabad.
4. Girard, M. C. and Girard, C. M. (2003): Processing of Remote Sensing Data. Oxford and IBH, New Delhi.
5. Glen, E. M. and Harold, C. S. (1993): GIS Data Conversion Handbook. Fort Collins, Colorado, GIS Word Inc.
6. Goodchild, M.F.; Park, B. O. and Steyaert, L. T. (eds.) (1993): Environmental Modelling with GIS. Oxford University Press, Oxford.
7. Guptill, S.C., and Morrison, J.L. (1995): Elements of Spatial Data Quality. Elsevier/ Pergamon, Oxford.
8. Heywood, I. (2003): An Introduction to Geographical Information Systems. 2nd edition, Pearson Publishing Company, Singapore.
9. Korte, G. M. (2002): The GIS Book. On Word Press: Thomson Learning, New York and Singapore.
10. Lo, C.P. and Yeung, A. K. W. (2002): Concepts and Techniques of Geographic Information Systems. Prentice Hall of India, New Delhi.
11. Longley, P. and Batty, M. (eds.) (1996): Spatial Analysis: Modelling in a GIS Environment. GeoInformation International, Cambridge.
12. Longley, P., Goodchild, M.F., Maguire, D. and Rhind, D. (1999): Geographic Information Systems. Principles, Techniques, Management, Applications. John Wiley and Sons, New York.
13. Maguirre, D. J.; Michael F. G. and David W. R. (1999): Geographical Information Systems: Principles and Application. Geo Information International, Vol.2, Longman Publication., New York.
14. Martin, D. (1996): Geographic Information Systems: Socioeconomic Implications. Routledge, London.
15. Michael F. G. and Karan K. K. (ed.) (1990): Introduction to GIS. NCGIA, Santa Barbara, California.
16. Ralston, B. A. (2002): Developing GIS Solutions with Map Objects and Visual Basic. OnWord Press: Thompson Learning, New York and Singapore.
17. Reddy, M. A. (2001): Textbook of Remote Sensing and Geographic Information Systems. B. S. Publications., Hyderabad.
18. Ripple, W. J. (ed.) (1989): Fundamentals of Geographic Information Systems: A Compendium. ASPRS/ ACSM, Falls Church.
19. Siddiqui, M.A. (2005): Introduction to Geographical Information Systems, Sharda Pustak Bhawan, Allahabad.
20. Star, J. and Estes, J. (1990): Geographic Information Systems – An Introduction. Prentice-Hall, Englewood Cliffs, New Jersey.

Course Title Geographical Information System – (P)

L	T	P	Cr	Marks
-	-	4	2	100

Course Code: GEO.604

Course Description:

The course provides a firm understanding of the conceptual and technical issues that affects the use of GIS and GPS. Through hands on exercise students will know about beauty of geographic/spatial data management.

Unit I

Practical Exercise: GIS Software: Introduction to Arc GIS 2. Georeferencing Maps/Images 3. Digitization of Raster Map: Point, Line and Polygon Features 4. Preparation of Attribute Tables, Editing and Joining Tables 5. Analyzing Attribute Data: Calculating Area, Perimeter, and Length.

Unit II:

Spatial Representation: Mapping Techniques 7. Spatial Representation: Symbolizing and Map Layouts 8. Basic Analysis in GIS: Buffering, Overlay and Query Building.

GPS Applications. User interface with global positioning receivers; Collection of ground control points using hand held GPS receiver; DGPS, wide area augmentation system (WAAS); transferring data from GPS receiver to PC.

Course Title: Course Title: Statistical Techniques in Geography-Practical

L	T	P	Cr	Marks
-	-	4	2	100

Course Code: GEO.605

Course description:

This paper outlined general concepts on computer and statistics for the student. The course design would benefit the student in computer and statistics requirement in other papers.

Unit I

Descriptive statistics: Measures of central tendency and dispersal, Histograms, Probability distributions (Binomial, Poisson and Normal), Sampling distribution. **Experimental design and analysis:** Sampling techniques, Sampling theory, Steps in sampling, Collection of data-types and methods.

Unit II:

Regression and correlation: Standard errors of regression coefficients, Comparing two regression lines, Pearson product-moment correlation coefficient, Spearman rank correlation coefficient.

Hypothesis. Comparing means of two or more groups: Student's t-test, Paired t-test, Mann-Whitney U-test, Wilcoxon signed-rank, One-way and two-way analysis of variance (ANOVA), Critical difference (CD), Least significant difference (LSD), Kruskal–Wallis one-way ANOVA by ranks, Friedman two-Way ANOVA by ranks, χ^2 test.

Suggested readings:

1. Burt J.E. Barber. G.E. Rigby D.L. (2009). Elementary Statistics for Geographers, Guilford Press, New York.
2. Richardson L. (2000). Writing: A method of inquiry. In N. Denzin and Y. Lincoln, eds. Handbook of Qualitative Research. Thousand Oaks, CA: Sage Publications, pp. 923-948.
3. Silverman D. (2000). Analyzing talk and text. In N. Denzin and Y. Lincoln, eds. Handbook of Qualitative Research. Thousand Oaks, CA: Sage Publications, pp. 821-834.
4. Waitt, G. (2010). Doing Foucauldian Discourse Analysis—Revealing Social Realities. In I.Hay, Ed. Qualitative Research Methods in Human Geography. Third Edition. Oxford: Oxford University Press, pp. 217-240.

GEO.699	Synopsis Seminar	1	-	-	1	-	-	-	100	100	Co
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Optional courses: Select any one from the followings:

Group A

Course Title: Urban Geography

L	T	P	Cr	Marks
4	1	-	4	100

Course Code: GEO.621

Unit I

(14 Lectures)

Characteristics of cities in different historical periods (both industrial and pre-industrial); Functions and functional classification of towns.

Unit II:

(14 Lectures)

Urban land use and functional morphology: functional areas and Peri-urban areas; Theories of urban structure (Burgess, Hoyt, Harris and Ullman, Mann, White). Remote Sensing and GIS in Urban planning.

Unit III:

(14 Lectures)

Issues and Planning. Urban problems: environmental, poverty, slums, transportation, housing, crime; Planned cities: Chandigarh and Jaipur; National Urban Policy and Urban land use planning, Master Plans: A case study of Chandigarh; Smart cities.

Unit IV:

(14 Lectures)

Urban transportation: Evaluation of Urban Structure Transportation systems; Management of Transportation system; Regional Transport system; Transport policies.

Suggested readings:

1. Bridge, B. and Watson, S. (eds.) (2000): A Companion to the City. Blackwell, Oxford.
2. Carter, H. (1995): The Study of Urban Geography. 4th ed. Reprinted in 2002 by Rawat Publications, Jaipur and New Delhi.
3. Dubey, K.K. (1976): Use and Misuse of Land in KAVAL Towns. National Geographical Society of India, Varanasi.
4. Dubey, K.K. and Singh, A.K. (1983): Urban Environment in India. Deep and Deep, New Delhi.
5. Dutt, A. Allen, K, Noble, G., Venugopal G. and Subbiah S. (eds.) (2003): Challenges to Asian Urbanisation in the 21st Century. Kluwer Academic Publishers, Dordrecht and London.

Additional readings:

1. Hall, P. (1992): Urban and Regional Planning. Routledge, London.
2. Hall, T. (2001): Urban Geography. 2nd edition. Routledge, London.
3. Haughton, G and Hunter, C. (1994): Sustainable Cities. Jessica Kingsley, London.
4. Jacquemin, A. (1999): Urban Development and New Towns in the Third World – A Lesson from the New Bombay Experience. Ashgate, Aldershot, UK.
5. Johnson, J.H. (1981): Urban Geography, Pergaman Press, Oxford.
6. Mayer, H. and Cohn, C. F. (1959): Readings in Urban Geography, University of Chicago Press, Chicago.

7. Paddison, R. (ed.) (2001): Handbook of Urban Studies. Sage, London.
8. Pacione, M. (2005): Urban Geography: A Global Perspective, Routledge, London and New York.
9. Ramachandran, R., (1991): Urbanisation and Urban Systems in India. Oxford University Press, Delhi.
10. Rao, B. P. and Sharma, N. (2007): Nagariya Bhoogol, Vasundhara Prakashan, Gorakhpur.
11. Singh, H. H. (1972): Kanpur: A Study in Urban Geography, Indrasini Publications, Varanasi
12. Singh, K. and Stainberg, F. (eds.) (1998): Urban India in Crisis. New Age International, New Delhi.
13. Singh, O. P. (1987): Nagariya Bhoogol, Tara Book Agency, Varanasi
14. Singh, R.L. (1955): Banaras. A Study in Urban Geography. Nand Kishore and Brothers, Banaras.
15. Singh, R.L. and Singh, Rana P.B., (eds.) (1979): Place of Small Towns in India. National Geographical Society of India, Varanasi,
16. Singh, Rana P.B. and Rana, P.S. (2002): Banaras Region. Indica Books, Varanasi.
17. Singh, S. B. (ed.) (1996): New Perspectives in Urban Geography. M.D. Publications, New Delhi.

Course Title: Urban Geography - Practical

L	T	P	Cr	Marks
-	-	4	2	100

Course Code: GEO.640

Unit I

Understanding and documenting Urban component such market place, organic and planned, residential districts, station areas, mill lands, urban villages, transport hubs etc.

Baseline surveys for a small/ medium town; Data collection and analysis, comparing with benchmark/standards. Graphic representation of the same.

Unit II:

Urban land use classification system; Remote Sensing and urban land use mapping, GIS and Urban Planning.

The structure and components of urban landscapes – documenting components such as parks, plazas, grounds, road dividers, traffic signals, dumping grounds, green belts etc.

Group B

Course Title: Photogrammetry-T

L	T	P	Cr	Marks
4	1	-	4	100

Course Code: GEO.629

Course Description:

This course introduces photogrammetry as a data acquisition tool, and provides a general overview of its theory and working principles. Students will gain the ability to extract data from aerial photography.

Unit I (11 Lectures)

Photogrammetry: Definition and Categories ii. Historical Background: Early Developments in Aerial Surveying and Mapping; Problems of Aerial Photogrammetry; Application of Photogrammetry.

Unit II: (15 Lectures)

Aerial photos: types, scale, resolution; Geometric properties of aerial photos; Stereoscopy; Stereoscopic parallax; Relief displacement. Calculation of Height of Objects on Vertical Aerial Photograph.

Unit III: (15 Lectures)

Interpretation keys and their types; Aerial mosaics; Multi-spectral aerial photographs; Ground control for mapping from aerial photos; Rectification methods in aerial photos.

Unit IV: (15 Lectures)

Aerial photo interpretation in general resource evaluation; Geomorphic studies and mapping. Land use/Land cover mapping; Ortho-photos and Contour Extraction; Applications and limitation of Aerial Photography.

Suggested readings:

1. Cracknell, A. and Ladson, H (1990): Remote Sensing Year Book. Taylor and Francis, London.
2. Curran, P.J. (1988): Principles of Remote Sensing. ELBS Longman, Essex, U.K.
3. Deekshatulu, B.L. and Rajan, Y.S. (ed.) (1984): Remote Sensing. Indian Academy of Science, Bangalore.
4. Floyd, F. S. Jr. (1997): Remote Sensing: Principles and Interpretation. W.H. Freeman, New York.
5. Hallert, B. (1960): Photogrammetry. McGraw Hill Book Company. Inc. New York
6. Leuder, D.R. (1959): Aerial Photographic Interpretation: Principles and Application, McGraw Hill, New York.

Additional readings:

1. Jensen, John R. Remote sensing of the Environment – An Earth Resource Perspective, Pearson Education, 2000.
2. Lillesand, T.M. and Kiefer, R.W. (2000): Remote Sensing and Image Interpretation. 4th ed. John Wiley and Sons, New York.
3. Pratt W.K. Digital Image Processing, Wiley, New York, 1978.

4. Rampal, K.K. (1999): Handbook of Aerial Photography and Interpretation. Concept Publishing. Company, New Delhi.
5. Reeves, R.G. (ed.) (1983): Manual of Remote Sensing. Vols. 1 and 2, American Society of Photogrammetry and Remote Sensing, Falls Church, Virginia.
6. Rao D.P. (eds.): Remote Sensing for Earth Resources, Association of Exploration Geophysicist, Hyderabad, 1998.
7. Siegel, B.S. and Gillespie, R. (1985): Remote Sensing in Geology. John Wiley and Sons, New York.
8. Spurr, R. (1960): Photogrammetry and Photo Interpretation. The Roland Press Company, London.
9. Survey of India, (1973): Photogrammetry. Survey of India, Dehradun.
10. Swain, P.H. and Davis, S.M. (ed.) (1978): Remote Sensing: The Quantitative Approach. McGraw- Hill, New York.
11. Thomas M. Lilesand and Ralph W.Kefer, Remote Sensing and Image Interpretation, John Wiley & Sons, New York, 1994.
12. Wolf P.R. and Dewitt, B. A. (2000): Elements of Photogrammetry with Applications in GIS. McGraw-Hill, New York.

Course Title: Photogrammetry -Practical

L	T	P	Cr	Marks
-	-	4	2	100

Course Code: GEO.630

Course Description:

The course will develop understanding of image interpretation and information extraction from Aerial photographs and determination of height of objects.

Unit I

Stereoscopy; Stereoscopic parallax; Relief displacement. Calculation of Height of Objects on Vertical Aerial Photograph; Identification of objects and features; Determination of height of objects from single photographs.

Unit II:

Preparation of thematic maps on lithology and structure, Land use/ Land cover, Hydrogeomorphic mapping.

**Course Title: Watershed Management
(Theory)**

L	T	P	Cr	Marks
4	1	-	4	100

Course Code: GEO.625

Course Description:

Unit I: Fundamentals of Watershed Management (11 Lectures)

- Introduction and Basic Concepts of watershed and watershed management, Watershed management policies and decision making
- Sustainable Watershed Approach and Practices: natural resources management, agricultural practices, integrated farming, Soil erosion and conservation; conjunctive use of water resources, rainwater harvesting; roof catchment system, Watershed Management Practices in Arid and Semiarid Regions

Unit II: Managing Water Resources (15 Lectures)

- Management of Water Quality: Water quality and pollution, types and sources of pollution, water quality modelling, environmental guidelines for water quality
- Drought Management: Drought assessment and classification, drought analysis techniques, drought mitigation planning
- Water Conservation and Recycling: Perspective on recycle and reuse, Waste water reclamation

Unit III: Social approach in watershed Management (15 Lectures)

- Social Aspects of Watershed Management: Community participation, Private sector participation, Institutional issues, Socio-economy, Integrated development, Water legislation and implementations, Case studies

Unit IV: Application of tools (15 Lectures)

- Use of modern techniques in watershed management: Applications of Geographical Information System and Remote Sensing in Watershed Management, Role of Decision Support System in Watershed Management

Suggested Readings:

1. Black, P.E. (1991): Watershed Hydrology, Prentice Hall, London
2. Michael, A.M. (1992): Irrigation Engineering, Vikas Publishing House
3. Murty, J.V.S. (1998): Watershed Management, New Age International, New Delhi
4. Murthy, J.V.S. (1994): Watershed Management in India, Wiley Eastern, New Delhi
5. Purandare, A.P. and Jaiswal, A.K. (1995): Waterhed Development in India, National Institute of Rural Development, Hyderabad
6. Vir Singh, R. (2000): Watershed Planning and Management, Yash Publishing House, Bikaner

**Course Title: Watershed Management
(Practical)**

L	T	P	Cr	Marks
4	1	-	2	100

Course Code: GEO. GEO.626

Course Description:

Unit I:

- Use of modern techniques in watershed management: Applications of Geographical Information System and Remote Sensing in Watershed Management, Role of Decision Support System in Watershed Management.

Unit II:

- Demarcation of watershed boundary and Morphometric analysis.

Suggested Readings:

1. Black, P.E. (1991): Watershed Hydrology, Prentice Hall, London
2. Michael, A.M. (1992): Irrigation Engineering, Vikas Publishing House
3. Murty, J.V.S. (1998): Watershed Management, New Age International, New Delhi
4. Murthy, J.V.S. (1994): Watershed Management in India, Wiley Eastern, New Delhi
5. Purandare, A.P. and Jaiswal, A.K. (1995): Waterhed Development in India, National Institute of Rural Development, Hyderabad
6. Vir Singh, R. (2000): Watershed Planning and Management, Yash Publishing House, Bikaner

**Course Title: Geography of Forest
(Theory)**

L	T	P	Cr	Marks
4	1	-	4	100

Course Code: GEO.627

Course Description: The paper underlines the geography of forest and the spatial distribution of forest in India. Forest being an important resource the paper reflects policies in relation to conservation and management.

Unit I: (11 Lectures)

- Concept of forest and forestry. Identification in types of forest and its characteristics, distribution of forest in India in relation to soil and climatic variation.
- Importance of forest resource; forest cover in India, Forest based industry, NTFP.

Unit II: (15 Lectures)

- Forest eco-system; Characteristic, feature and structures
- Concept of forest carbon index; contribution and policies

Unit III: (15 Lectures)

- Forest conservation and management policies in India; community forestry
- Incidence of forest fire and forest disturbances in India.

Unit IV: (15 Lectures)

- Application of Remote sensing and GIS in the forest study.
- Role of modern techniques in forest study and policy implementation.

Suggested Readings:

**Course Title: Geography of Forest
(Practical)**

L	T	P	Cr	Marks
4	1	-	2	100

Course Code: GEO.628

Course Description: Forest management would be best understood in various techniques related to remote sensing and GIS. Thus the paper reflects various tools in identification and mapping changes in relation to forest.

Unit I:

- Application of Remote sensing and GIS in the forest study. Mapping of forest types through satellite data.

Unit II:

- Exercise in topographical measuring (transects, orientation, etc.) and in special survey and measure techniques concerning the terrain structure and the vegetation structure.

Suggested Readings:

Course Title: Social and Demography Geography (Theory)

L	T	P	Cr	Marks
4	1	-	4	100

Course Code: GEO.629

Course Description: The paper reflects various social issues in relation to demographic feature. The student would be introduced to various concepts of social as well as demography that would inculcate in structuring thoughts in the minds of student.

Unit I (11 Lectures)

- Social Welfare and Well-being: Concept and Components – Healthcare, Housing and Education.
- Social Geographies of Inclusion and Exclusion, Slums, Gated Communities, Communal Conflicts and Crime.

Unit II: (15 Lectures)

- Population ageing and dependency ratios
- Concept of Space: Social space, Material space

Unit III: (15 Lectures)

- Introduction to Demography. History of Population Growth. Geographic Distribution of World Population and Global Variations in Population Size and Growth.
- Theories of Population Growth: Malthus and Marx
- The Concepts of Age and Sex. Impact of Mortality rate

Unit IV: (15 Lectures)

- Demographic evaluation of Family Planning Programme
- Demography Dynamics: Fertility, Mortality and Migration – Measures, Determinants and Implications

Suggested Reading:

1. Ahmed A., 1999: Social Geography, Rawat Publications.
2. Casino V. J. D., Jr., (2009) Social Geography: A Critical Introduction, Wiley Blackwell.
3. Cater J. and Jones T., 2000: Social Geography: An Introduction to Contemporary Issues, Hodder Arnold.
4. Holt L., 2011: Geographies of Children, Youth and Families: An International Perspective, Taylor & Francis.
5. Panelli R., 2004: Social Geographies: From Difference to Action, Sage.
6. Rachel P., Burke M., Fuller D., Gough J., Macfarlane R. and Mowl G., 2001: Introducing Social Geographies, Oxford University Press.
7. Smith D. M., 1977: Human geography: A Welfare Approach, Edward Arnold, London.
8. Smith D. M., 1994: Geography and Social Justice, Blackwell, Oxford.
9. Smith S. J., Pain R., Marston S. A., Jones J. P., 2009: The SAGE Handbook of Social Geographies, Sage Publications.
10. Sopher, David (1980): An Exploration of India, Cornell University Press, Ithasa
11. Valentine G., 2001: Social Geographies: Space and Society, Prentice Hall

**Course Title: Social and Demography Geography
(Practical)**

L	T	P	Cr	Marks
4	1	-	2	100

Course Code: GEO.630

Course Description: This paper is intended to help the student giving geographical thoughts in carrying out research related to demographic issue.

Unit I

- Procedures of data collection: primary and secondary
- Sampling techniques : random, stratified random and purposive
- Preparation of choropleth map, histogram, etc.

Unit II:

- Measures of dispersion: mean deviation, quartile deviation, standard deviation and Co-efficient of variation.
- Bivariate scatter diagram and regression trend line
- Coefficient of correlation after Karl Pearson

Suggested Reading:

1. Ahmed A., 1999: Social Geography, Rawat Publications.
2. Casino V. J. D., Jr., 2009) Social Geography: A Critical Introduction, Wiley Blackwell.
3. Cater J. and Jones T., 2000: Social Geography: An Introduction to Contemporary Issues, Hodder Arnold.
4. Holt L., 2011: Geographies of Children, Youth and Families: An International Perspective, Taylor & Francis.
5. Panelli R., 2004: Social Geographies: From Difference to Action, Sage.
6. Rachel P., Burke M., Fuller D., Gough J., Macfarlane R. and Mowl G., 2001: Introducing Social Geographies, Oxford University Press.
7. Smith D. M., 1977: Human geography: A Welfare Approach, Edward Arnold, London.
8. Smith D. M., 1994: Geography and Social Justice, Blackwell, Oxford.
9. Smith S. J., Pain R., Marston S. A., Jones J. P., 2009: The SAGE Handbook of Social Geographies, Sage Publications.
10. Sopher, David (1980): An Exploration of India, Cornell University Press, Ithasa
11. Valentine G., 2001: Social Geographies: Space and Society, Prentice Hall

Semester 4

Course Title: Fundamentals of Remote Sensing-T

L	T	P	Cr	Marks
4	1	-	4	100

Course Code: GEO.606

Course Description:

It introduces the students to the basic concepts and the skills necessary to acquire remote sensing data and extract geo-information from them. The objective of this course is to give understanding of fundamentals of remote sensing.

Unit I (14 Lectures)

Fundamental Concepts of Remote Sensing:

Remote Sensing: Definition, Concept, History and Applications; Types of Remote Sensing; Remote Sensing Platforms and Scanning Systems.

Unit II: (14 Lectures)

EMR Principles and Interaction Mechanisms:

Radiation Principles; Electromagnetic Spectrum; Energy-Atmosphere Interaction; Atmospheric Windows; Energy-Earth Interaction; Spectral Signatures of Surface Features.

Unit III: (14 Lectures)

Remote Sensing platforms, sensors and satellite series:

RS Satellites- Polar sun-synchronous, geo-stationary; Platforms: Types and their orbital characteristics; Sensors types: active and passive; Sensors systems: whiskbroom and push broom; Principles and geometry of scanners and CCD arrays; Satellite RS data products or series: LANDSAT, SPOT, IRS, IKONOS, Quick bird.

Unit IV: (14 Lectures)

Image Processing and Interpretation:

Image: Meaning and Types (Analogue and Digital) and Characteristics; Resolution: Spatial, Spectral, Radiometric and Temporal; Basics of Image Processing; Elements of Image Interpretation. Ground Truth Collection, Visual Interpretation.

Suggested readings:

1. Cracknell, A and Hayes, L. (1990). Remote Sensing Year Book, Taylor and Francis, London.
2. Curran, P.J. (1985). Principles of Remote Sensing, Longman, London.
3. Deekshatulu, B.L. and Rajan, Y.S. (ed.) (1984). Remote Sensing. Indian Academy of Science, Bangalore.
4. Floyd, F. and Sabins, Jr. (1986). Remote Sensing: Principles and Interpretation, W.H. Freeman, New York.
5. Guham, P. K. (2003). Remote Sensing for Beginners. Affiliated East-West Press Private Ltd., New Delhi.

Additional readings:

1. Hallert, B. (1960). Photogrammetry, McGraw Hill Book Company Inc., New York
2. Harry, C.A. (ed.) (1978). Digital Image Processing, IEEE Computer Society, California
3. Hord, R.M. (1982). Digital Image Processing of Remotely Sensed Data, Academic Press, New York.
4. Leuder, D.R. (1959). Aerial Photographic Interpretation: Principles and Application. McGraw Hill, New York.
5. Lillesand, T.M. and Kiefer, R.W. (2000). Remote Sensing and Image Interpretation. 4th edition. John Wiley and Sons, New York.
6. Nag, P. (ed.) (1992). Thematic Cartography and Remote Sensing, Concept Publishing. Company, New Delhi.
7. Reeves, R.G. (ed.) (1983). Manual of Remote Sensing, Vols. 1 and 2, American Society of Photogrammetry and Remote Sensing, Falls Church, Virginia.
8. Siegel, B.S. and Gillespie, R. (1985). Remote Sensing in Geology, John Wiley and Sons, New York.
9. Silver, M. and Balmori, D. (eds.) (2003). Mapping in an Age of Digital Media. Wiley-Academy, New York and Chichester.
10. Spurr, R. (1960). Photogrammetry and Photo Interpretation, The Roland Press Company, London.
11. Survey of India, (1973). Photogrammetry, Survey of India, Dehradun.
12. Swain, P.H. and Davis, S.M. (ed.), (1978). Remote Sensing: The Quantitative Approach. McGraw Hill, New York.

Course Title: Fundamentals of Remote Sensing- Practical

L	T	P	Cr	Marks
-	-	4	2	100

Course Code: GEO.607

Course Description: The practical course gives operational skills necessary to acquire remote sensing data and extract geo-information from them.

Unit I

Remote sensing and image interpretation:

Referencing layout and indent of Landsat TM or IRS imageries; Identification of objects / features on multiband imageries; Detection of defined objects/features; Preparation of Image interpretation keys; Interpretation, classification, delineation and mapping of land use/land cover from False Colour Composite (FCC); Transfer of information from imagery to base map.

Unit II:

Image Processing:

Digital Image: Definition, size and Image Formats; Image Processing System : Image Registration : Image to map and Image to Image; Image Enhancement Techniques : Histogram Equalization. Contrast stretching, filtering and band rationing. Image Classification: selection of training sets, supervised and unsupervised classification.

GEO.700	Dissertation/Project work and Viva voce	-	-	-	10	-	-	-	-	-	Co
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Elective courses: Select any one special group based on specialisation from the followings:

Group A

Course Title: Geography of Disaster

L	T	P	Cr	Marks
4	1	-	4	100

Course Code: GEO.631

Course Description:

The course in Geography, as a science of human-environment interactions, offers key analytical tools for understanding the complex causes and uneven impacts of disaster and hazards around the world. It explores various types and impacts of disasters.

Unit I (8 Lectures)

Concept of vulnerability, risk, mitigation, prevention, preparedness, response and recovery; Classification of Disasters.

Unit II: (14 Lectures)

Natural hazards and disasters – definition and areas, natural hazards, meteorological –cyclones, typhoons, hurricanes and droughts, forest fires, causes, assessment, effects and control measures. **Natural hazards** – Geological – earthquakes, volcanoes, causes, effects and control measures; **Natural hazards** – Geomorphic – landslides, soil erosion and gullying, coastal erosion causes, assessment, effects and control measures.

Unit III: (22 Lectures)

Man-made disaster: Fire, Terrorism, Food poisoning, strike and lockouts, accidents, fair and festivals, stampedes. **Impacts of Disasters:** Social, Economic, political, environmental, health, psychological; Differential impacts: Caste, class, gender, age, location, disability..

Unit IV: (10 Lectures)

Risk and vulnerability assessment hazard zonation, Use of remote sensing and GIS in hazard studies

Suggested readings:

1. Turk J. (1985). Introduction to Environmental Studies, Saunders, College Publication, Japan
2. Singh Savindra (2000). Environmental Geography, Parag Pustak Bhavan, Allahabad
3. Morrisawa M (Ed) (1994). Geomorphology and Natural Hazards, Elsevier, Amsterdam
4. Hart M. G. (1986). Geomorphology, Pure and Applied, George Allen and Unwin, London
5. Valdiya K. S. (1987). Environmental Geology, Tata McGraw Hill, New Delhi.

Additional readings:

1. Bryant Edward (2000). Natural Hazards, Cambridge University Press
2. Daly Herman E. (1996). Beyond Growth, Beacon Press, Boston
3. Daly Herman E and Twonseed Keneth N (Ed) (1993). Valuing the earth – Economics, Ecology and Ethics, MIT Press, London
4. Agarwal Anil and Narain Sunita (Ed) (1999). State of India’s Environment The Citizens Report, Centre for Science and Environment, New Delhi

5. Rangachari R, Sengupta Nirmal, et al (2000). WCD Case Study Large Dams : India's Experience Final Report, Secretariate of World Commission on Dams
6. Dupont, R.R. Baxter, T.E. and Theodore, L. (1998). Environmental Management :- Problems and Solutions, CRC Press
7. Smith, K. (2001). Environmental Hazards : Assessing Risk and Reducing Disaster, Routledge.

Course Title Geography of Disaster-Practical

L	T	P	Cr	Marks
-	-	4	2	100

Course Code: GEO.632

Course Description:

The course place emphasis on analytical geographical tools to study disasters. Students will learn to do mapping and prepare hazard zones using remote sensing and GIS techniques.

Unit I

Risk and vulnerability assessment hazard zonation, Use of remote sensing and GIS in hazard studies.

Unit II:

Hazards zonation/ mapping: meteorological –cyclones, typhoons, hurricanes and droughts, forest fires, causes, assessment, effects and control measures. Natural hazards – Geological – earthquakes, volcanoes, causes, effects and control measures; Natural hazards – Geomorphic – landslides, soil erosion and gullying, coastal erosion causes, assessment, effects and control measures.

Group B

Course Title: Gender, Health and Development

L	T	P	Cr	Marks
4	1	-	4	100

Course Code: GEO.633

Unit I

(14 Lectures)

The Concept of gender, Evolution of gender in historical perspective; Patriarchy, Kinship Structure and gender roles, Feminist theories, Gender stratification in traditional and modern societies, Gender Analysis Tools, Gender Sensitive Indicators;

Concept of health, Evolution of the concept of Reproductive Health, life cycle approach to RH and recommendations from ICPD; Changing concept of development, Indicators of development, gender adjusted HDI.

Unit II:

(14 Lectures)

Major morbidity and mortality burden in the developing world with major focus on India- sex ratio of births, major health problems experienced by women and men, reproductive health of women and men in developing world, differentials in use of male and female methods of contraception;

Health infra-structure and health care providers; Nutritional status, susceptibility to infections;

Major risk factors of men's health: masculinity, alcoholism, tobacco and drug consumption, accident;

Gender and Sexuality: Sexual health of men and women, gender dimension of HIV /AIDS; Gender and Infertility.

Unit III:

(14 Lectures)

Gender and Development: Understanding social structures- role of caste, class, ethnicity and religion and gender in health inequalities and health outcomes; Gender dimension of social development, status and role of men and women in household and community, culture, marriage customs, dowry and bride price practices, age at marriage; Gender differentials in household headship and role in decision making; Gender differences in access to knowledge-, education, exposure to media and freedom of movements; Gender based violence- Domestic and community violence and gender, Legal aspects of domestic violence and rape.

Unit IV:

(14 Lectures)

The concept of Gender Mainstreaming: Historic overview of Gender Mainstreaming- Women in development (WID)-concept and criticism by feminist; shift to Gender and Development (GAD), Gender Mainstreaming and the Millennium Development Goals (MDGs); The rights approach to Health, sexual and reproductive rights, violence, human rights and health.

Suggested readings:

1. Basu, Alaka M., (1992): Culture, The Status of Women and Demographic Behaviour, Oxford University, New York.
2. Bhasin K. (1993). What is patriarchy?, Kali for Women Publishers, New Delhi.
3. Bhasin K. (2000). Understanding Gender, Kali for Women Publishers, New Delhi.
4. Dyson, Tim and Mick Moore, (1983). "On Kinship structure, female autonomy, and demographic behaviour in India", Population and Development Review vol. 9(1), pp. 35-60.
5. Ellsberg Mary and Heise Lori L. (2005). Researching violence against women: A practical guide

for researchers and activists. WHO and Path, Washington D.C.

Additional readings:

1. Folbre, Nancy. (1992). Improper arts: Sex in classical political economy. Population and Development Review. 18(1): 105-112.
2. Gita Sen, Adreinne Germain and Lincoln C. Chen, (Eds.), (1994): Population Policies
3. Reconsidered: Health and Empowerment and Rights, Harvard University Press, Harvard.
4. Jeffery Patricia and R. Jeffery. 1997. Population Gender and Politics: Demographic change in rural north India. Cambridge University, Cambridge.
5. Miller, Barbara, D. (ed) (1993). Sex and Gender Hierarchies, Cambridge University Press, New York.
6. Hess, B.B. and M.M. Ferree. (1987). Analyzing Gender: A Handbook of Social Science Research. Sage Publication, London.
7. United Nation. (2001). Population, Gender and Development: A Concise Report. UN, Economic and Social Affairs (Dept. of), New York
8. World Health Organization. (1998). Gender and Health. Technical paper WHO/FRH/WHO/98. (Website: www.who.int)
9. World Bank. (1991). Gender and Poverty in India. World Bank, Washington.
10. World Health Organization (2003): Comparative Evaluation of Indicators for Gender Equity and Health, Women and Health Programme, Centre for Health Development, Kobe, Japan.
11. William Joan. (1989). Deconstructing Gender, 87 Michigan L Rev. 797. Law Journal Article

Course Title Gender, Health and Development - Practical

L	T	P	Cr	Marks
-	-	4	2	100

Course Code: GEO.634

Unit I

Introduction to SPSS- facilities, creating database structure, data entry, specifying scales, validation of data entry, importing and exporting data. Data Manipulation–recoding creating new variable, sorting, filtering and selection of specific data, generating simple frequencies, use of syntax editor. Correlation and regression analysis– interpretation and regression diagnostic test.

Unit II:

Introduction to STATA, generating, variables, commands and do file editor. Survey analysis – estimation of mean, proportion, design. Multivariate analysis–concepts and interpretation of results of multiple regressions, logistic regression, ANOVA, with and without interaction. Survival analysis – Kaplan Meier, Cox regression -test of proportionality and heterogeneity. Introduction to GIS and illustration.

Group B

Course Title: Digital Image Processing & Information Extraction

L	T	P	Cr	Marks
4	1	-	4	100

Course Code: GEO.635

Course Description:

This course will introduce fundamental technologies for digital image processing, information extraction, information analysis, and processing. Students will gain understanding of analytical tools, and implementations of various digital image applications.

Unit I (14 Lectures)

Introduction to Digital Image Processing & Information Extraction

Digital Data Formats; Image Rectification–I
(Radiometric and Atmospheric Correction Techniques)

Image Rectification–I
(Geometric Correction Techniques)

Unit II: (14 Lectures)

Image enhancement techniques–I
(Linear and non-linear contrast stretching)
Image enhancement techniques - II
(Image filtering–Low pass, high pass, edge enhancement & detection filters)

Unit III: (14 Lectures)

Image Transformation
(Spectral rationing, density slicing, Principal Component analysis etc.)

Unit IV: (14 Lectures)

Information Extraction–I
(Unsupervised/Supervised and Hybrid classification techniques)
Information Extraction–I
(Accuracy Assessment and integration with GIS)

Suggested readings:

1. Campell, J. B. (2003): Introduction to Remote Sensing. 4th ed. Taylor and Francis, London.
2. Cracknell, A. and Ladson, H (1990): Remote Sensing Year Book. Taylor and Francis, London.
3. Curran, P.J. (1985): Principles of Remote Sensing. Longman, London.
4. Deekshatulu, B.L. and Rajan, Y.S. (ed.) (1984): Remote Sensing. Indian Academy of Science, Bangalore.
5. Floyd, F. and Sabins, Jr. (1986): Remote Sensing: Principles and Interpretation. W.H. Freeman, New York.

Additional readings:

1. Gautam, N.C. and Raghavswamy, V. (2004): Land Use/ Land Cover and Management Practices in India. B.S. Publications., Hyderabad.
2. Harry, C.A. (ed.) (1987): Digital Image Processing. IEEE Computer Society, California.
3. Hord, R.M. (1982): Digital Image Processing of Remotely Sensed Data. Academic Press, New York.
4. Jensen, J.R. (1986): Introductory Digital Image Processing: A Remote Sensing Perspective, Prentice-Hall, Englewood Cliffs, New Jersey.
5. Jensen, J.R. (2004): Remote Sensing of the Environment: An Earth Resource Perspective. Prentice-Hall, Englewood Cliffs, New Jersey. Indian reprint available.
6. Lillesand, T.M. and Kiefer, R.W. (2000): Remote Sensing and Image Interpretation. John Wiley and Sons, New York.
7. Nag, P. (ed.) (2000): Thematic Cartography and Remote Sensing. Concept Publishing Company, New Delhi.
8. Nag, P. and Kudrat, M (1998): Digital Image Processing, Concept Publishing Company, New Delhi.
9. Rampal, K.K. (1999): Handbook of Aerial Photography and Interpretation. Concept Publishing Company, New Delhi.
10. Reeves, R.G. (ed.) (1983): Manual of Remote Sensing, Vols. 1 and 2. American Society of Photogrammetry and Remote Sensing, Falls Church, Virginia.
11. Renz, A.N. (ed.) (1999): Remote Sensing for the Earth Sciences: Manual of Remote Sensing. American Society of Photogrammetry and Remote Sensing, and John Wiley and Sons, New York.
12. Siegel, B.S. and Gillespie, R. (1985): Remote Sensing in Geology. John Wiley and Sons, New York.
13. Swain, P.H. and Davis, S.M. (ed.) (1978): Remote Sensing: The Quantitative Approach. McGraw Hill, New York.

Course Title: Digital Image Processing and Spatial analysis - Practical

L	T	P	Cr	Marks
-	-	4	2	100

Course Code: GEO.636

Course description:

Through this course students will gain knowledge and practical experience in digital image processing.

Unit I

Image Rectification, Image enhancement and Image transformation

Unit II:

Information Extraction–I

(Unsupervised/Supervised and Hybrid classification techniques) Information Extraction–I

(Accuracy Assessment and integration with GIS)