

CENTRAL UNIVERSITY OF PUNJAB

BATHINDA



Centre for Geography and Geology

Course Structure and Syllabus

for

M.A. Geography

1st to 4th SEMESTER

Academic Session 2015-17

Course Structure and Syllabus for M.A. Geography

Course Code	Course Title	Credit Hours				% Weightage				E	CBC S
		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	Principles of Climatology	4	1	-	4	25	25	25	25	100	Co
GEO.503	Evolution of Geographical Thought	4	1	-	4	25	25	25	25	100	Co
GEO.504	Computer applications and Statistics	2	-	-	2	25	25	25	25	100	Fd
GEO.505	Computer Applications and Statistics-Practical	-	-	4	2	-	-	-	100	100	Fd
GEO.506	Cartography- Theory	2	-	-	2	25	25	25	25	100	Fd
GEO.507	Cartography- Practical	-	-	4	2	-	-	-	100	100	Fd
GEO.599	Assignment based Seminar-I	1	-	-	1	-	-	-	100	100	Co
Elective courses: Select any one of the interdisciplinary courses listed below											
IC.	Interdisciplinary course from other discipline	2	-	-	2	-	25	-	25	50	El
Total		19	3	8	23	-	-	-	-	850	
Semester-II											
Core courses											
GEO.508	Oceanography	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	Quantitative methods in geography-Practical	-	-	4	2	-	-	-	100	100	Fd
GEO.511	Human Ecology	4	1	-	4	25	25	25	25	100	Co
GEO.512	Socio-economic survey –Practical	-	-	4	2	-	-	-	100	100	Fd
GEO.599	Assignment based Seminar-II	1	-	-	1	-	-	-	100	100	Co
Elective courses: Select any one of the interdisciplinary courses listed below											
IC.	Interdisciplinary course from other discipline	2	-	-	2	-	25	-	25	50	El
Optional courses: Select any one of the courses listed below											
GEO.521	Geography of Settlement	4	1	-	4	25	25	25	25	100	El
GEO.522	Political Geography	4	1	-	4	25	25	25	25	100	El
GEO.523	Regional Planning in India	4	1	-	4	25	25	25	25	100	El
GEO.524	Principles of Economic Geography	4	1	-	4	25	25	25	25	100	El
GEO.525	Human Geography	4	1	-	4	25	25	25	25	100	El
GEO.526	Agricultural Geography	4	1	-	4	25	25	25	25	100	El
Total		19	4	8	23	-	-	-	-	750	
Semester-III											
Core courses											
GEO.601	Fundamentals of Remote Sensing	4	1	-	4	25	25	25	25	100	Co

GEO.602	Fundamentals of Remote Sensing-Practical	-	-	4	2	-	-	-	100	100	Co
GEO.603	Research Methodology in Geography and synopsis writing	4	-	-	4	25	25	25	25	100	Fd
GEO.604	Field visit (Max. ten days) and report writing	-	-	-	1	-	-	-	100	100	Co
GEO.699	Assignment based Seminar-III	1	-	-	1	-	-	-	100	100	Co
Optional courses I: Select any one from the followings:											
GEO.621	Sustainability Studies	4	1	-	4	25	25	25	25	100	Co
GEO.622	Social Geography	4	1	-	4	25	25	25	25	100	Co
GEO.623	Biogeography	4	1	-	4	25	25	25	25	100	Co
GEO.624	Gender Geography	4	1	-	4	25	25	25	25	100	Co
GEO.625	Geography of Health and Well-being	4	1	-	4	25	25	25	25	100	Co
GEO.626	Environmental Planning and Management	4	1	-	4	25	25	25	25	100	Co
Optional courses II: Select any one special group based on specialisation from the followings:											
Group A											
GEO.627	Population Geography	4	1	-	4	25	25	25	25	100	EI
GEO.628	Population Geography-Practical	-	-	4	2	-	-	-	100	100	EI
Group B											
GEO.629	Fundamentals Of Photogrammetry	4	1	-	4	25	25	25	25	100	EI
GEO.630	Fundamentals Of Photogrammetry - Practical	-	-	4	2	-	-	-	100	100	EI
Group C											
GEO.631	Geography of Rural Settlement and Planning	4	1	-	4	25	25	25	25	100	EI
GEO.632	Geography of Rural Settlement and Planning -Practical	-	-	4	2	-	-	-	100	100	EI
Group D											
GEO.633	Geography of Disaster	4	1	-	4	25	25	25	25	100	EI
GEO.634	Geography of Disaster - Practical	-	-	4	2	-	-	-	100	100	EI
	Total	17	3	8	22	-	-	-	-	800	
Semester-IV											
Core courses											
GEO.605	Fundamentals of GIS and GPS	4	1	-	4	25	25	25	25	100	Co
GEO.606	Fundamentals of GIS and GPS-Practical	-	-	4	2	-	-	-	100	100	Co
GEO.700	Dissertation/Project work and Viva voce	-	-	-	10	-	-	-	100	300	Co
Elective courses: Select any one special group based on specialisation from the followings:											
Group A											
GEO.634	Gender, Health and Development	4	1	-	4	25	25	25	25	100	EI
GEO.635	Gender, Health and Development - Practical	-	-	4	2	-	-	-	100	100	EI

Group B											
GEO.636	Digital Image Processing & Information Extraction	4	1	-	4	25	25	25	25	100	El
GEO.637	Digital Image Processing & Information Extraction -Practical	-	-	4	2	-	-	-	100	100	El
Group C											
GEO.638	Geography of Urban System and Planning	4	1	-	4	25	25	25	25	100	El
GEO.639	Geography of Urban System and Planning -Practical	-	-	4	2	-	-	-	100	100	El
Group D											
GEO.640	Disaster Preparedness and Management	4	1	-	4	25	25	25	25	100	El
GEO.641	Disaster Preparedness and Management - Practical	-	-	4	2	-	-	-	100	100	El
	Total	8	2	8	22	-	-	-	-	700	
	Grand total	63	12	32	90	-	-	-	-	3100	

A: Continuous Assessment: Based on Objective Type Tests 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	Choice Based Credit System (CBCS): 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 process that would help in understanding different landforms on the earth's surface.

Unit I (12 Lectures)

Development in geomorphology, Historical and process Geomorphology, The geomorphic systems, Geomorphic Materials and process: weathering, sediment production, pedogenesis, mass movement, erosion, transportation and deposition, Landforms in relation to climate, rock type, structure and tectonics.

Unit II: (12 Lectures)

Geomorphic processes and landforms – fluvial, glacial, eolian, coastal and karst. River forms and processes – stream flow, stage-discharge relationship; hydrographs and flood frequency analysis, Submarine relief, Environmental change– causes, effects on processes and landforms. Extra-terrestrial geomorphology.

Unit III: (16 Lectures)

Physiography, drainage, climate, soils and natural resources of the Himalaya, Ganga Brahmaputra Plains, and peninsular India, Climate zones of India. Geomorphology and topographic analysis including DEM, Topographical maps, Geomorphic mapping, slope analysis and drainage basin analysis, Applications of geomorphology in mineral prospecting, civil engineering, hydrology and environmental studies.

Unit IV: (16 Lectures)

Planetary evolution of the earth and its internal structure. Heterogeneity of the earth's crust. Major tectonic features of the Oceanic and Continental crust. Seafloor spreading and Plate Tectonics. Island arcs, Oceanic islands and volcanic arcs. Continental drift – geological and geophysical evidence, mechanics, objections, present status.

Gravity and magnetic anomalies at Mid-ocean ridges, deep sea trenches, continental shield areas and mountain chains. Palaeomagnetism. Isostasy, orogeny and epeirogeny. Seismic belts of the earth. Seismicity and plate movements. Geodynamics of the Indian plate.

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.
18. 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: Principles of Climatology

L	T	P	Cr	Marks
4	1	-	4	100

Course Code: GEO.502

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

(04 Lectures)

Nature and Scope of Climatology, development of applied climatology, climate impact, Earth's Atmosphere: Evolution, Structure and Composition.

Unit II:

(14 Lectures)

Solar radiation and Terrestrial radiation, Latitudinal and seasonal variation, effect of atmosphere, greenhouse effect and distribution of solar radiation over the earth; global heat budget. Temperature: Concept, measurement, scales, daily and annual cycles of temperature; vertical distribution; world distribution.

Unit III:

(14 Lectures)

Atmospheric pressure and winds: Vertical variation of pressure; horizontal variation of pressure; forces affecting wind: pressure systems; surface winds.

Atmospheric moisture and precipitation: Concept and measurement of atmospheric moisture; condensation - forms of condensation; adiabatic temperature changes, hydrologic cycle; formation and types of precipitation; global distribution of precipitation.

Unit IV:

(12 Lectures)

Models of general circulation of the atmosphere, Jet stream, Air masses and fronts, characteristics, movements, frontogenesis– extra tropical cyclones, tropical cyclones, ENSO phenomena; **Classification of climates:** Empirical and generic, Climatic classification with special reference to Koppen and Thornthwaite.

Unit V: (12 Lectures)

Applied Climatology: Climate and the physical environment: soil, and water resources, flora and fauna. Climate and human environment: agricultural and industrial. Climate, urbanization and urban planning. Weather forecasting and recent trends in climatology. Micro climates. Urban climate – industrial transport and commercial activities.

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.
7. Mather, J.R. (1974). 'Climatology: Fundamentals and Applications', McGraw-Hill, New York.

Course Title: Evolution of Geographical Thought

L	T	P	Cr	Marks
4	1	-	4	100

Course Code: GEO.503**Course Description:**

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

Unit I (4 lectures)**Basic Concepts:**

The field of Geography, its place in the classification of Sciences; Geography as a social science and natural science; Selected concepts in the philosophy of geography; Man-environment interaction: New environmentalism; Concepts of space, place and time.

Unit II: (14 lectures)**Genesis of Geographic Thought:**

Ancient Geography: Contributions of Greek, Roman and Arab Geographers. Impact of voyages; Discoveries and Renaissance on Geographical Thought. Foundation of Scientific Geography (Contributions of Varenus and Kant).

Unit III: (12 lectures)**Evolution of Modern Geographic thought-I**

Classical period of modern geography contributions (Humboldt and Ritter) and Darwin's impact on Geography; Contributions of Ratzel and Blache; Shifting viewpoints in Geography during the latter half of Nineteenth Century.

Unit IV: (12 lectures)

Evolution of Modern Geographic thought-II

The debate between Determinist and Possibilists; Geography as science of relationships and as science of distributions. Geography as Chorological science and as Morphology of Landscape.

Unit V:

(14 lectures)

Exceptionalism and the Schaefer-Hartshorne debate. Positivism and its reactions (behavioural and radical approaches). Post modernism and feminist Geography. Gaia theory and links to Indian literature; Ancient Indian geography and scientific outlook (e.g. cultural astronomy); Future of Indian geography: problems, perspectives and prospects.

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. Bunkše, E. V. (2004): Geography and the Art of Life. John Hopkins University Press, Baltimore.
5. Buttner, A. (1971): Society and Milieu in the French Geographic Tradition. Rand McNally, Chicago.
6. Daniels, P., Bradshaw, M., Shaw, D. and Sidaway, J. (2000): An Introduction to Human Geography. Issues for the 21st Century. Prentice Hall, London.
7. Dear, M. J. and Flusty, S. (2002): The Spaces of Postmodernity: Readings in Human Geography. Blackwell Publishers, Oxford.
8. Doel, M. (1999): Poststructuralist Geographies. The Diabolical Art of Spatial Science. Edinburgh University Press, Edinburgh
9. Gaile, G. and Wilmott, C. (eds.) (2003): Geography in America at the Dawn of the 21st Century. Oxford University Press, Oxford and New York.
10. Hartshorne (1939). The Nature of Geography. Association of American Geographers Lancaster Pennsylvania.
11. Hartshorne (1959). Perspective on the Nature of Geography Rand McNally and company Chicago.
12. Harvey, D. (1969): Explanation in Geography. Arnold, London.
13. Harvey, M. E. and Holly, P.B. (2002): Themes in Geographic Thought. Rawat Publications., Jaipur and New Delhi.
14. Hubbard, P., Kitchin, R., Bartley, B. and Fuller, D. (2002): Thinking Geographically: Space, Theory and Contemporary Human Geography. Continuum, London.
15. Johnston, R, Gregory D, Pratt G, Watts M. and Whatmore S. (2003): The Dictionary of Human Geography. Blackwell Publishers, Oxford. 5th edition.
16. Johnston, R.J. (1985): The Future of Geography, Methuen and Company Ltd., New York. (2003 edition published).
17. Johnston, R.J. and Sidaway, J.D. (2004): Geography and Geographers. 6th edition, Edward Arnold, London.
18. Kapur, A. (ed.) (2001): Indian Geography – Voice of Concern. Concept Publishing. Company, New Delhi.
19. Martin, G. (2005): All Possible Worlds. A History of Geographical Ideas. 4th edition, Oxford University Press, New York.

20. Mathews, J. A. and Herbert, D. T. (eds.) (2004): Unifying Geography. Common Heritage, Shared Future. Routledge, London.
21. Peet, R. (1998): Modern Geographical Thought. Blackwell Publishers Inc, Massachusetts.
22. Sack, R. D. (ed.) (2002): Progress. Geographical Essays. John Hopkins University Press, Baltimore.
23. Sauer, C. O. (1963): Land and Life. University of California Press, Berkeley.
24. Singh, R. L. and Singh, Rana P.B. (eds.) (1990): Literature and Humanistic Geography. National Geographical Society of India, BHU, Varanasi, Publication number 37
25. Singh, R. L. and Singh, Rana P.B. (eds.) (1992): The Roots of Indian Geography: Search and
26. Singh, Rana P.B. (ed.) (1993): Environmental Ethics. National Geographical. Society of India, BHU, Varanasi, Publication number 40.
27. Singh, Rana P.B. (ed.) (1994): The Spirit and Power of Place. National Geographical Society of India, BHU, Varanasi, Publication number 41.
28. Singh, Rana P. B. (2004): Cultural Landscapes and the Lifeworld. Indica Books, Varanasi.
29. Soja, E. (1989): Post-modern Geographies. Verso Press, London. Reprinted 1997: Rawat Publications, Jaipur and New Delhi.
30. Taylor, G. (ed.) (1953): Geography in the Twentieth Century. Methuen and Company Ltd. and Company, London.
31. Tuan, Yi-Fu (1977): Space and Place. The Perspective of Experience. Edward Arnold, London.
32. Singh, Ravi S (ed.) 2009. Indian Geography: Perspectives, Concerns and Issues. Jaipur/New Delhi: Rawat Publications.

Course Title: Computer applications and Statistics

L	T	P	Cr	Marks
2	-	-	2	100

Course Code: GEO.504

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 (10 Lectures)

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: (10 Lectures)

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.

Unit III: (12 Lectures)

Overview of statistics: Difference between parametric and non-parametric statistics, Univariate and multivariate analysis, Confidence interval, Errors, Levels of significance, Hypothesis testing.

Descriptive statistics: Measures of central tendency and dispersal, Histograms, Probability distributions (Binomial, Poisson and Normal), Sampling distribution, Kurtosis and skewness.

Unit IV: (12 Lectures)

Experimental design and analysis: Sampling techniques, Sampling theory, Steps in sampling, Collection of data-types and methods.

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.

Unit V:

(12 Lectures)

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

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.
6. Douglas, Gretchen and Mark Connell. Fundamentals of MS Office 2007. Second edition, Dubuque: Kendall Hunt Publication Company, 2007.
7. Gookin, D. (2007). MS Word for Dummies. Wiley.
8. Harvey, G. (2007). MS Excel for Dummies. Wiley
9. Jamsa, Kris A. DOS: The Pocket Reference. Berkeley: Osborne McGraw-Hill, 1993.
10. Murdock, Everett E. DOS The Easy Way:A Complete Guide to Microsoft's MS DOS. H O T Press, Easy Way Downloadable Books, 1988.
11. Narang, Rajesh. Database Management System. New Delhi: PHI Learning Pvt. Ltd., 2006.
12. Rajaraman, V. Fundamentals of Computers. New Delhi: PHI Learning Pvt. Ltd., 2003.Sanders, Donald H. Computers Today. Singapore: McGraw Hill Publishing, 198.
13. 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.
14. 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. 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.
15. Sinha, P.K., Computer Fundamentals, BPB Publications.

GEO.505	Computer Applications and Statistics-Practical	-	-	4	2	-	-	-	100	100	Fd
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Course Title: Cartography- Theory

L	T	P	Cr	Marks
2	-	-	2	100

Course Code: GEO.506**Course description:**

The main foundation of geography lies with cartography. This paper gives a theoretical understanding about the historical development as well as various tools and techniques of map making.

Unit I (8 lectures)

Science of Cartography: History and development of Cartography; Science of cartography and communication theory; Sources of cartographic data; Cartographic techniques and methods in preparation of diagrams and maps; Thematic mapping; soil and vegetation maps, Environmental maps and Population maps (rural and urban); Atlas Mapping; Pre- and -post census mapping.

Unit II: (10 lectures)

Fundamentals of Cartography: Fundamentals of direction, scale, types, sources; Details of Datum, Geodetics, Spheroid; Classification of maps; Elements of maps: Generalization, Symbolization and Classification.

Unit III: (10 lectures)**Relief Mapping:**

Relative relief: GH Smith and Robinsons methods; Morphometric Analysis: Drainage Density, Stream order, Elongation ratio, Circularity ratio, Bifurcation ratio; Toposheet interpretation.

Unit IV: (12 lectures)**Mapping socio-economic data:**

Techniques of mapping: dot, choropleth, isopleths and diagrammatic; Cartograms: Use of socio-economic data, circle and sphere methods, square and block methods, Population Density; Rural – Urban population; Patterns of irrigation, Location of Industries.

Suggested readings:

1. Dickinson.G.C. 1968: Statistical Mapping and Presentation of Statistics. Arnold, London.
2. Keates, J.S. (1998). Cartographic Design and Production, Longman, London.
3. Lawrence. G.R.P,1971 : Cartographic Methods, Methuen , London.

Additional Readings:

4. Misra, R.P. and Ramesh, A. (1989). Fundamental of Cartography, Concept Publishing Company, New Delhi.
5. Monkhouse, F.J. (1994). Maps and Diagrams, Methuen and Co., London.
6. Raisz, E. (1962). Principles of Cartography, McGraw Hill, New York.
7. Robinson, A.H. et al. (1992). Elements of Cartography, John Willy & Sons, New York, 6th edition.
8. Ramamurthy, K. (1982). Maps Interpretation: India Landscapes through Survey of India, Topographic Maps, R.K. Mutt Road, Madras.
9. Wood Clifford H. and Keller C. (1996). Cartographic Design- Theoretical and Practical Perspectives, John Wiley & Sons.

Course Title: Cartography- Practical

L	T	P	Cr	Marks
-	-	4	2	100

Course Code: GEO.507**Course description:**

Practical on cartographic tools and techniques related to data distribution and understanding topographical maps is the basic elements of the course design.

Unit I

(14 lectures)

Fundamentals of Cartography:

Elements of maps: Generalization, Symbolization and Classification; Techniques of mapping: dot, choropleth, isopleths and diagrammatic; Principles of map designing.

Mapping socio-economic data:

Cartograms: Use of socio-economic data, circle and sphere methods, square and block methods, Population Density; Rural –Urban population; Patterns of irrigation, Location of Industries.

Unit II

(14 lectures)

Relief Mapping:

Relative relief: GH Smith and Robinsons methods; Morphometric Analysis: Drainage Density, Stream order, Elongation ratio, Circularity ratio, Bifurcation ratio; Toposheet interpretation.

Applied Cartography:

Any one of following:

1. Topographic mapping
2. Service and utility mapping
3. Drainage Basin Mapping

Note: Students will have to prepare a set of five maps on any two selected themes.

Semester-II

Course Title: Oceanography

L	T	P	Cr	Marks
4	1	-	4	100

Course Code: GEO.508

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 (11 lectures)

Nature and Scope of Oceanography – Major features of Ocean basins, continental margin and deep ocean basins – Bottom relief of Indian, Atlantic and Pacific Oceans.

Unit II: (11 lectures)

Physical and chemical properties of sea water, sources and factors affecting the distribution of temperature and salinity.

Unit III: (11 lectures)

Circulation patterns in the ocean – ocean currents, water masses, waves, tides and tsunamis, their types and theories of origin.

Unit IV: (11 lectures)

Marine biological environment, bio zones – Plankton, Nekton and Benthos, ocean deposits, coral reef, theories of their origin.

Unit V: (12 lectures)

Impacts of Humans on the Marine Environment – Laws of the sea, marine resources, development and pollution, EEZ and resource utilization.

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 (2ndEd.).
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: 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 (12 Lectures)**Physical aspects and Resources:**

Making of India through geological times, structure and relief, physiographic divisions, drainage systems and watersheds, climate characteristics, mechanism of the Indian monsoon, soil-water resources, forest types, distribution and utilization.

Unit II: (9 Lectures)**Agriculture:**

Salient features of agriculture, agricultural regions, major crops, problems and prospects, green revolution and its impact, white, blue and yellow revolutions.

Unit III: (15 Lectures)**Industry:**

Evolution of industries: Locational factors of cotton, jute, textile, iron and steel, aluminium, fertilizer, paper, chemical and pharmaceutical, automobile, cottage and agro-based industries; Industrial houses and complexes including public sector undertakings; Industrial regionalisation; New industrial policies; Multinationals and liberalization; Special Economic Zones; Tourism including eco-tourism.

Unit IV: (10 Lectures)**Population structure and composition:**

Size, distribution and density; dynamics of population – Migration and urbanization, population policy.

Unit V: (10 Lectures)

Dynamic, prospective and problem regions of India, Regional disparities in the levels of economic development, Globalisation and its impact on Indian economy and society.

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: Quantitative Methods in Geography- Practical

L	T	P	Cr	Marks
-	-	4	2	100

Course Code: GEO.510

Course description:

Scientific research in geography requires an understanding into tools and techniques for explaining data. This course is design to help students understand quantitative methods in their research works.

Unit I**Geographic pattern and its measures:**

Nearest Neighbour Analysis; Gini's Co-efficient; Lorenz curves; Location quotient; Rank size rule

Unit II:**Network Analysis:**

Indices of transport network efficiency; Compositing the indices of transport network efficiency; Indices of nodal accessibility; Local degree –Road Local degree –Rail. Weighed road capacity and tortousrity ratio; Compositing the indices of nodal accessibility.

Unit III:**Methods of predictions and levels of measurement:**

Levels of measurement; Methods of sampling; Simple linear regression analysis; Plotting of regression line; Plotting of absolute and relative residuals; Explanation of residuals plotted on the maps.

Unit IV:**Measures of disparities and potential model:**

Gravity and potential models; Delimitation of hinterlands; Combinational analysis of Weaver, S.M. Rafiulla’s method, Measures of Disparities: Kendall’s ranking method.

Suggested readings:

1. Berry, B.J.L. and Marble, D.R. (ed), 1968, Spatial Analysis: A Reader in Statistical Geography, Prentice Hall, New York.
2. Cole, J.P. and Kind, C.A.M. 1968. Quantitative Geography, John, Wiley, New York.
3. Ibrahim, R., 1984. Market Centers and Regional Development. B.R. Publisher, New Delhi.
4. Mahmood, A, 1986. Statistical Methods in Geographic Studies. Rajesh Publishers, New Delhi.
5. Smith, D.M., 1975. Patterns in Human Geography, Penguin Books, England.
6. Maurice, Yeats, 1974. An Introduction to Quantitative Analysis in Human Geography, McGraw Hill, New York.
7. Peter Hagget, Andrew. D. Cliff and Allen Frey, 1977. Locational Methods Vol. 1 and 11,
8. Edward Arnold, London Company, New Delhi.

Course Title: Human Ecology

L	T	P	Cr	Marks
4	1	-	4	100

Course Code: GEO.511**Course description:**

The course introduce to the concept of ecology with reference to human ecology. The course design will help in better understanding to human and it environment relationship that forms a foundation of geography.

Unit I

(10 Lectures)

Human Ecology:

Evolution & Development; Key Concepts: Anthropocentrism, cultural lag, the commons and theories; Environmental ethics.

Unit II:

(12 Lectures)

Humans and environment:

Humans and the Biosphere: Co-evolution and co-adaptation of human system and ecosystems; Resources, technologies, environment and consumerism: Problems and consequences; Geographies of wealth, hunger and health.

Unit III:

(12 Lectures)

Humans and biophysical system:

Humans as agents of larger social system; Human population size, growth and biophysical carrying capacity of Earth; Positive and negative feedback of human numbers and quality of life; Denaturalization of country and city; Alteration of biogeography, material cycles and energy flow.

Unit IV:

(12 Lectures)

Global change adaptation:

Environmental crises and human reintegration. The end of duality: Adaptation and behavioural change; Environmental Management (undoing misdeeds): Eco regional and watershed Management strategies; Landscapes restoration and conservation of biodiversity.

Unit V:

(10 Lectures)

Case studies of human induced ecological changes: (a) Hill ecosystems with specific reference to Punjab Shivalik. (b) Wetland ecosystems with specific reference to the Punjab wetlands. (c) Agricultural ecosystems with specific reference to the Green Revolution in Punjab.

Suggested readings:

1. Agarwal, A., Narain, S. and Sen, S. (1999). 'The Citizens' Fifth Report, Centre for Science and Environment, New Delhi.
2. Beeby, A. and Brennan, A. (2008). First Ecology: Ecological Principles and Environmental Issues, 3rd Edition, Oxford University Press.
3. Brar, Karanjot Kaur. (1999). Green Revolution: Ecological Implications, Dominant Publishers, Delhi.
4. Chandna, R.C. (1998). Environmental Awareness, Kalyani Publishers, New Delhi.
5. Dhabriya, S.S. (1988). Desert Spread and Desertification: An Analysis of the Identified Aravalli Gaps on the Desert Fringe, Environmental Research Publication-1, Environmentalist, Jaipur, 1988.
6. Dhabriya, S.S. (1988). Ecocrisis in the Aravalli Hill Region, Environmental Research Publication-2, Environmentalist, Jaipur.
7. Dieter Steiner and Marcus Nauser (eds.): Human Ecology; New York: Routledge, 1993
8. Ehrlich, P.R., A.H. Ehrlich and J.P. Holdren: Human Ecology, San Francisco: W.H. Freeman & Co.; 1973
9. George A. Theodorson (ed.): Studies in Human Ecology, New York:
10. Global Environment Outlook (2000). Earthscan Publications, London.
11. Golley, Frank B. (1998). A Primer for Environmental Literacy, Universities Press (India) Limited, Hyderabad.
12. Harper & Row, 1961 Ernst, W.G. (ed.), Earth Systems: Processes and Issues, Cambridge University Press, U.K., 2000.
13. Kormondy, Edward J. (1989). Concepts of Ecology, Third Edition, Prentice-Hall of India, New Delhi.
14. Odum, Eugene P. (1971). Fundamentals of Ecology, Natraj Publishers, Dehra Dun.
15. Osborne, P. (2000). Tropical Ecosystems and Ecological Concepts, Cambridge University Press, U.K.

Course Title: Socio-economic survey- Practical

L	T	P	Cr	Marks
-	-	4	2	100

Course Code: GEO.511**Course description:**

This course will help the student to interact with people in studying their socio-economic study. A survey schedule will be organised in selected areas (village/town/etc) for 10 – 15 days. This will help the student understand and interact with people more closely that would be beneficial for carrying out research in future.

Unit I

Procure a topographic map of 1:50,000 to 1:25,000 scale to study the Settlements selected in its regional setting. Prepare a site map of the survey area; settlement, road, water body, agricultural field etc.

Unit II:

Collection of socio-economic profile data of the survey site and create a demographic profile from the secondary data; Data procure from census office, economic and statistics office. Assessment of the secondary data by using statistical tools and techniques.

Unit III:

Conduct a socio-economic survey of the households with a structured scheduled/questionnaire. Supplement the information by personal observations and perceptions.

Based on results of the land-use and socio-economic enquiry of the households, prepare a critical field-survey report. Photographs and sketches, in addition to maps and diagrams, may supplement the report.

Suggested readings:

1. Gregory, S, 1980. Statistical methods and the Geographer, Longman, London.
2. Mahmood, A. 1986. Statistical Methods in Geographical Studies, Rajesh Pub., New Delhi.
3. Ibrahim, R., 1992. Socio-Economic Profile of Mewat, Radha Publishers, New Delhi.
4. Robinson, A.H. 1978. Elements of Cartography, John Wiley, New York.
5. Raisz, E. 1962. Principles of Cartography, Mc Graw Hill, New York.

Optional courses: Select any one of the courses listed below

Course Title: Geography of Settlement

L	T	P	Cr	Marks
4	1	-	4	100

Course Code: GEO.521**Course description:**

The course introduces studying the geography of settlement. The pattern of settlement varies in urban as well as rural that effect the development of a region. Thus understanding the phenomena is essential for student of geography. The course designs with special reference to Indian context.

Unit I

(13 lectures)

Significance and scope of settlement geography; Development of settlement geography, Methodological advances in the study of settlement geography; Approaches to the study of settlements: Evolutionary, spatial, and ecological; Types of settlement: Clustered and dispersed.

Unit II:

(13 lectures)

Rural Settlements:

Definition and characteristics; Site and situation. The evolution of field boundaries and field patterns. Types and materials of farm fencing; Folk housing and folk architecture; Traditional building materials.

Unit III: (15 lectures)

Urban Settlements:

Site and situation; Size and spacing of urban settlements; 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.

Unit IV: (15 lectures)

Settlement in India:

Indian Village: Nature and characteristics; A model of Indian village by Spate; Study of rural settlements in India with special reference to their morphological characteristics; Approaches to the morphogenesis of Indian villages. **Orientation and segregation of castes in villages; Dichotomy in built environment: Mohammad Habib and Budha Prakash Debate; Study of landscape as a text.**

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.
10. Hudson, R.S. (1970). Geography of settlements, McDonald and Sons, London.
11. Peters, G. L. and Larkin, R.P. (1983). Population Geography. Problems, Concepts and Prospects. Kendall/Hunt, Dubuque, IA.

Course Title: Political Geography

L	T	P	Cr	Marks
4	1	-	4	100

Course Code: GEO.522

Course description:

The course on political geography introduces various political dynamics in different regions. The understanding into this dynamics would help the students in understanding the study of spatial aspects in geographical explanation.

Unit I (6 Lectures)

Nature, Scope, subject matter and recent development in Political Geography; Approaches to study; major schools of thoughts.

Unit II: (12 Lectures)

Geographic elements and the state; Physical Elements; Human Elements; Economic Elements; Political Geography and Environment Inter-face.

Unit III: (12 Lectures)

Themes in political geography: State, Nation, Nation-state and Nation-building; Frontiers and Boundaries; Colonialism, Decolonization, Neo-colonialism, Federalism and other forms of governance. The changing patterns of World Powers Perspectives on core periphery concepts, Conflicts cooperation.

Unit IV: (12 Lectures)

Geopolitical significance of Indian ocean; Political geography of any one of the following regions; SAARC region, South East Asia, West Asia, East Asia.

Unit V: (14 Lectures)

Political Geography of contemporary India with special reference to: The changing Political map of India, Unity-Diversity, Centripetal and Centrifugal forces, Stability and Instability, Inter-state issues (lake water disputes and riparian claims) and Conflict Resolutions Insurgency in boarder states; Emergence of New States and Federal India.

Suggested readings:

1. Adhikari, S. (1997). Political Geography, Rawat Publications, Jaipur and Delhi.
2. Bandhopadhy, J. (1991). The Making of India's Foreign Policy, Allied Publications, Delhi.
3. Bhambri, C.P. (1991). Political Process in India, Vikas, New Delhi.
4. Brass, P. R. (1990). The Political Economy of India Since Independence, Cambridge University Press, New Delhi.
5. Brass, P.R. (1983). Caste, Faction and Party in Indian Politics, Vol. I and II, Chankya Publications, Delhi.
6. Brass, P. R. (2003). The Production of Hindu Muslim Violence in Contemporary India, Oxford University Press, Delhi.
7. D Blij, H J and Glassner, M. (1968) Systematic Political Geography, John Wiley, New York.
8. Deshpande, C.D. (1992). India: A Regional Interpretation, I.C.S.S.R, New Delhi.
9. Dikshit R.D. (1996). Political Geography; A Contemporary Perspective, Tata McGraw Hill, New Delhi.
10. Harrison, S. et. al. (ed.) 1999. India and Pakistan: The First Fifty Years, Woodrow Wilson Centre and Cambridge University Press.
11. Oommen, T.K. (1990). Protest and Change Studies in Social Movements, Sage, New Delhi.
12. Pannikar, K.N. (1955). Geographical Factors in India's History, Bharatiya Vidya Bhavan, and Bombay.
13. Taylor, P. (1985) Political Geography, Longman, London.

Course Title: Regional Planning in India

L	T	P	Cr	Marks
4	1	-	4	100

Course Code: GEO.523

Course description:

Regions as a geographical entity have become a centre of study or interest in modern research. Due to the growing economies and urbanisation, understanding the concept of regional planning and its various elements is important for student. The course specially highlights Indian context.

Unit I (14 Lectures)

Fundamentals: Concept, nature and scope of regional planning, methods of regional planning, different approaches to regional planning, planning regions, concept and types; methods of delimitation, planning regions of India, regional policies in India.

Unit II: (14 Lectures)

Conceptual Outlook. Regional planning and national development; Economic development and regional development; Regional economic complexes; Inter-regional and intra-regional functional interactions; Regional disparities in India.

Unit III: (14 Lectures)

Approaches. Approaches to integrated regional planning at different levels: local, regional and national; Spatial organisation: Central Place Theory, Concept of core and periphery Friedmann's Model of Spatial Organisation and Economic Growth. Growth centres and Growth pole theory of Perroux.

Unit IV: (14 Lectures)

Planning and region:

Five Year Plans: command area development, planning for backward area, desert drought-prone, hill and tribal area development; Multi-level planning in India: State, District and Block level planning; Decentralized planning and Panchayati raj; watershed management; Regional economic imbalances and inequalities in India; SEZs in regional development.

Suggested readings:

1. Chandna, R. C. (2000). Regional Planning: A Comprehensive Text. Kalyani Publishers., New Delhi.
2. Chaudhuri, J. R. (2001). An Introduction to Development and Regional Planning with special reference to India. Orient Longman, Hyderabad.
3. Cowen, M.P. and Shenton, R.W. (1996). Doctrines of Development. Routledge, London.
4. Doyle, T. and McEachern, D. (1998). Environment and Politics. Routledge, London.
5. Friedmann, J. (1992). Empowerment: The Politics of Alternative Development. Blackwell, Cambridge MA and Oxford.
6. Friedmann, J. and Alonso, W. (ed.) (1973). Regional Development and Planning. The MIT Press, Mass.
7. Hettne, B.; Inotai, A. and Sunkel, O. (eds.) (1999–2000). Studies in the New Regionalism. Vol.I-V. Macmillan Press, London.
8. Isard, W. (1960). Methods of Regional Analysis. MIT Press, Cambridge, MA.
9. Kuklinski, A. R. (1972). Growth Poles and Growth Centres in Regional Planning. Mouton and Co., Paris.
10. Kuklinski, A.R. (ed.) (1975). Regional Development and Planning: International Perspective, Sijthoff-Leydor.
11. Leys, C. (1996). The Rise and Fall of Development Theory. Indian University Press, Bloomington, and James Curry, Oxford.
12. Mahapatra, A.C. and Pathak, C. R. (eds.) (2003). Economic liberalisation and Regional Disparities in India. Special Focus on the North Eastern Region. Star Publishing House, Shillong.
13. Kane, M. and William M.K.T.(2007): Concept Mapping for Planning and Evaluation, Sage Publications, London.
14. Misra, R. P. (ed.) (1992). Regional Planning: Concepts, Techniques, Policies and Case Studies. 2nd edition. Concept Publishing Company., New Delhi.
15. Misra, R.P. and Natraj, V.K. (1978). Regional Planning and National Development. Vikas, New Delhi.
16. Misra, R.P., Sundaram, K. V. Pradasa Rao, V. L. S. (1976). Regional Development Planning in India. Vikas Publishers, New Delhi.

Course Title: Principles of Economic Geography

L	T	P	Cr	Marks
4	1	-	4	100

Course Code: GEO.524**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 (6 Lectures)

Introduction: Definition, nature and scope, Recent trends in Economic Geography; Economic Landscape: Homestead, Tribal and Village economy, Modern economic landscape. Von Thunen and Weber's models. (8 Lectures)

Unit II: (12 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, Spatial variation in the factor cost, Variation in cost of transportation, spatial variation in demand, Internal and external economies of scale.

Unit III: (12 Lectures)

Environment-Society and Economy Interface and Organisation of Production: Global Patterns and Trends: Distribution and mobilization of resources-Cultivable land/ Water, Energy resources; Economic growth-environmental concerns and sustainability.

Unit IV: (12 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 V: (14 Lectures)

Spatio-social organization of production –Transport and Industry, Trade and Services: Global Patterns and trends: Organisation of transport and telecommunication- Role of transport cost- nodes-places, networks and flows- spatio-social accessibility – hierarchies; Location of plant- Critical review of industrial location theory- agglomeration economies and linkages; Industrial regions- Fordist and neo-Fordist forms of Organization, International trade theory- Critical review – trade barriers and Trade blocks, WTO; Service sector- typology and theoretical bases- trade in services.

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.

9. Krugman, P. (1995). Development, Geography and Economic Theory, MIT Press, Massachusetts.

10. Lee, R. and Wills, J. (ed.) (1997). Geography of Economics, Arnold, New York

Course Title: Human Geography

L	T	P	Cr	Marks
4	1	-	4	100

Course Code: GEO.525

Course description:

The course design explains the relation of man and nature, distributions of human and phenomena relations to the locations.

Unit I (12 Lectures)

Nature of human geography and its development: Definition and contents; human versus physical geography; branches of Human Geography; Development of Human Geography; Contributions of German and French Geographers. **Man-environment relationship:** Elements of environment; physical and human environment; constraints and opportunities of the environment; impact of environment on man; impact of man on environment; environmental problems.

Unit II: (12 Lectures)

Major races: Physical characteristics and distribution of the major racial groups (Caucasoid, Mongoloid and Negroid); Origin and diffusion of major racial groups in the world; Linguistic and religious regions in the world.

Unit III: (12 Lectures)

Geography of Difference and Exclusion: Geographies of identity and difference related to class, religion, caste, gender and location; social justice and political geography of difference. Geographical Organisation of Power: Spatial meaning and definitions of power; dynamics of spatio-social interactions and power; geopolitics of power-territoriality and globalization.

Unit IV: (12 Lectures)

Geography of social action and movements: Reasons and approaches to social movements; aspects of social security; social-environmental movements in India.

Unit V: (12 Lectures)

Population, Resources And Development: Demographic transformations: Growth of world population, Differential, Population change, The progress of Demographic Transition, Population Agency; Resources and development: Natural resources, Fuelling the Planet, Energy and Development; Changing geographies of global food production: Population Growth and Food Supply, Globalization and Food Regimes, Reorientation of developing world Agriculture; Alternative geographies of global development and inequality.

Suggested readings:

1. Agnew, J.A. and Corbridge, S. (1995). Mastering Space: Hegemony, Territory and International Political Economy, Routledge, London.
2. Benko, G. and Strohmayr, U. (1997). Space and Social Theory: Interpreting Modernity and Postmodernity, Blackwell Publishers, Oxford, London.
3. Bergwan, Edward E: (1995). Human Geography: Culture, Connections and Landscape, prentice-Hall, New Jersey.
4. Bhabha, H. (1994), The Location of Culture, Routledge, London and New York.
5. Carr, M. (1987). Patterns, Process and change in Human Geography, MacMillan Education, London.

6. Cloke, P., Crang, P. and Goodwin, M (1999). *Introducing Human Geographies*, Arnold, London.
7. Corbridge, S., Martin, R. and Thrift, N. (1997). *Money, Power and Space*, Blackwell, Oxford.
8. Daniels, P., Bradshaw, M., Shaw, D and Sidaway, J., (2001) *Human Geography: Issues for the 21st Century*, Pearson, Delhi.
9. Derek, G., Martin, R., and Smith, G. (1994). *Human Geography: Society, Space and Social Science*, Macmillan Publishers, Cambridge.
10. De Blij H.J. (1996). *Human Geography, Culture, Society and Space* John Wiley, New York.
11. Fellmah, J.L. (1997). *Human Geography- Landscapes of Human Activities*. Brown and Benchman Pub., U.S.A.
12. Johnston, R.J. (1991). *A Question of Place: Exploring the Practice of Human Geography*, Blackwell Publishers, Cambridge. Johnston, R.J. (ed. 1994). *Dictionary of Human Geography* Balckwell, oxford.
13. McBride, P.J. (1996). *Human Geography Systems, Patterns and Change*, Nelson, U.K. and Canada.
14. Michael, C. (1997). *New Patterns: Process and Change in Human Geography* Nelson.

Course Title: Agricultural Geography

L	T	P	Cr	Marks
4	1	-	4	100

Course Code: GEO.526

Course description:

The course introduces the nature of agricultural geography, spatial pattern of cropping in different places and theories related to location of agricultural activities.

Unit I (14 Lectures)

The nature, subject matter and progress in Agricultural Geography. Approaches: commodity, systematic, regional. Determinants: physical, economic, socio-cultural. Determinants of agricultural development: physical, technological, institutional; World agricultural systems. A critical evaluation of the classification of world agriculture with special reference to Whittlesey.

Unit II: (15 Lectures)

Cropping patterns and their measurements: crop concentration, crop diversification, crop combinations, measurement of agricultural efficiency, agricultural productivity; Agricultural location models: Von Thunen and Lössch.

Unit III: (12 Lectures)

Land-use survey and classification (British and Indian). (vi) Land capability classification (U.S. and Britain). Agriculture during plan periods; Diffusion of agricultural innovations; Green revolution and its effects on economy, society and environment; Agro-climatic regions and their planning; Measurement and levels of agricultural development; Problems and prospects of Indian agriculture.

Unit IV: (15 Lectures)

New perspectives in Agriculture: Contract Farming, Agri-business and Food Security. Nutrition, malnutrition and hunger; Rural poverty and unemployment; Poverty alleviation strategies; Food aid and nutrition programmes; Food security and its components; Sustainable agriculture.

Suggested readings:

1. Dyson, T. 1996. *Population and Food –Global Trends and Future Prospects*, Routledge, London.
2. Gobind, N. 1986. *Regional Perspectives on Agricultural Development* ; Concept Publications; New Delhi
3. Gregory, H.F. 1970. *Geography of Agriculture*; Prentice Hall Englewood Cliff; New Jersey.
4. Grigg F.D.B. 1974. *The Agricultural Systems of the World*, Cambridge University Press;

New York.

5. Hussain, M. (1996). *Systematic Agricultural Geography*, Rawat Publications, Jaipur.
6. Ilbery, B. W. (1985). *Agricultural Geography*, Oxford University Press, Oxford, 1985.
7. Shafi, M. (2006). *Agricultural Geography*, Pearsons Publications, New Delhi.
8. Shafi, M. (1984). *Agricultural Productivity and Regional Imbalances: A Study of Uttar Pradesh*, Concept Publication Company, New Delhi.
9. Singh, J. and Dhillon, S.S. (1984). *Agricultural Geography*, Tata McGraw Hill, New Delhi.
10. Singh, J. (2003). *Agricultural Geography*, 3rd edition, Oxford, New Delhi.
11. Symons, L. (1967). *Agricultural Geography*, G. Bells, London.

Semester-III

Course Title: Fundamentals of Remote Sensing

L	T	P	Cr	Marks
4	1	-	4	100

Course Code: GEO.601

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

Fundamental Concepts of Remote Sensing:

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

Unit II:

EMR Principles and Interaction Mechanisms:

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

Unit III:

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:

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.602

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

Unit I | (14 Lectures)

Remote sensing and image interpretation:

Referencing layout and indent of Landsat TM and 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: | (14 Lectures)

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.

Course Title: Research Methodology in Geography and synopsis writing

L	T	P	Cr	Marks
4	-	-	4	100

Course Code: GEO.603

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.

GEO.604	Field visit (Max. ten days) and report writing	-	-	-	1	-	-	-	-	100
GEO.699	Assignment based Seminar-III	1	-	-	1	-	-	-	-	100

Optional Courses I: Select any one of the courses listed below:

Course Title: Sustainability Studies

L	T	P	Cr	Marks
4	1	-	4	100

Course Code: GEO.621

Course Description: The course gives interdisciplinary perspective to the students. It creates awareness and inculcates knowledge about concept and practices for sustainability.

Unit I (11 Lectures)

Sustainable Development: Definition, concept and historical developments; difference between economic growth, economic development and sustainable development; economic theories of sustainable development, reconciliation between political and theoretical discourses.

Unit II: (15 Lectures)

Geography and Sustainable Development: Sustainable development in disciplinary perspective, sustainable development and geographical agenda, geography and the pursuit of sustainable development. Sustainable Development and the Spatial Scale and Spatial Interaction : Structuring global scale, achieving sustainable development at local, regional, national and global scales, sustainable development and open economies, interaction between different spatial scales.

Unit III: (15 Lectures)

Sustainable Development of Urban Regions: Impacts of urban development, urban modelling and sustainability assessment, models of sustainable urban development, problems and prospects.

Making Cities Sustainable: Continuity and change in urban problems, defining sustainable urban development, urban challenges in developing world.

Sustainable Economic Development: Business and the environment, sustainable economic development as Eco-efficiency, sustainable farming, resource efficiency and resource redistribution, and sustainable futures.

Unit IV:

(15 Lectures)

Climate change, Energy, and Sustainable Development: Climate change as a threat to sustainable development, current and future climate regimes, mitigating climate change.

Sustainable Development and International Relations: International relations theories, climate change And global discourse, discourses in conflict at international forums.

Future Perspectives: Existing strategies for sustainable development, consensus and contest, challenge of sustainable development, sustainable development and societal change.

Suggested readings:

1. Adams, W.M. (2001). Green Development: Environment and Sustainability in Developing Countries, 2nd edition, Routledge, London.
2. Barbier, E.B. (1987). The Concept of Sustainable Development, Environmental Conservation, 14(2), 101-110.
3. Daly, H.E. (1999). "Towards Some Operational Principles of Sustainable Development", Ecological Economics, 2(1), 1-6.
4. World Commission on Environment and Development (1987). Our Common Future, Oxford University Press, Oxford.
5. University Press, Oxford.
6. Purvis, M. and Alan Grainger (2004). Exploring Sustainable Development: Geographical Perspectives, Earthscan, London.

Course Title: Social Geography

L	T	P	Cr	Marks
4	1	-	4	100

Course Code: GEO.622**Course Description:**

This course introduces some of the main themes of social geography in context of social structure and social changes. The course also place emphasis on spatial perspective of various social issues of India.

Unit I

(11 Lectures)

Fundamental concepts:

Definition, scope and development of Social Geography; Relationship of social geography with other branches of Social Science. Concepts of social space, social area analysis and social wellbeing. Development of social geography in India.

Unit II:

(15 Lectures)

Pattern and processes:

World Distribution of religious and linguistic groups; Cultural realm and their distribution; Socio-economic and environmental issues of the developed and developing countries; Process and problems of social change in the traditional societies.

Unit III:

(15 Lectures)

Social structure of India:

Distribution of racial and linguistic groups of India; Distribution of various social groups (i.e. SC, ST, OBC) and their socio-economic issues; Regional imbalances with-reference to literacy, health, poverty and crimes in India; Levels of social wellbeing in India/HDI.

Unit IV:

(15 Lectures)

Social issues in India:

Unity in diversity; Regional consciousness and national integration; Social conflicts and violence.; Emphasis of social planning during Xth and XIth Five Year Plans.

Suggested readings:

1. Ahmed, A.(1999). Social Geography, Rawat Publication, Jaipur.
2. Carter, John and Jones, T.(1989),Social Geography: An Introduction to Contemporary Issues, Edward Arnold, London.
3. Chandana R.C.(1989), Spatial Dimensions of Scheduled Castes in India, Intellectual Publishers House, New Delhi.
4. Crane, R.I.(1973), Regions and Regionalism in South Asia Studies: An Exploratory Study, Durham, Duke University.
5. D.M. Smith(1995), Geography and Social Justice, Black-well.

Additional readings:

1. Dube, S.C. (1991). Indian Societies, National Book Trust of India, New Delhi.
2. Dube, S.C, Tribal Heritage of India, Vias Publishing Co, New Delhi.
3. Ghurye,G.S.(1963), The Scheduled Tribes, Bombay, Popular Prakashan.
4. Guha, B.S.(1944), Racial Elements in Indian Population, Oxford University Press, Bombay.
5. Knox,P.(1982), Urban Social Geography:An Introduction, Longman, London.
6. Konx, P.L.(1975), Social Well –being: A Spatial Perspective, Oxford London.
7. Manson, P., “Unity and Diversity: An Introductory Review” in P, Manson (ed.) India and Ceylon: Unity and Diversity pp. 1-19.
8. Morris, D. et. Al.(1982), Measuring the Condition of India’s Poor: The Physical Quality of life index, Promila, New Delhi.
9. Sakharov,IV.(1971), “Ethno Linguistic Geography of India. Facts and Problems”, In Economic and Socio-cultural Dimensions of Regionalization, Cencus of India, Monograph.No.7.
10. Singh, K.S.(1985), Tribal Society in India, Manohar.
11. Smith, D.M.(1977), Human Geography: A Welfare Approach, Edward Arnold.
12. Smith D.M., Geography of Social Well Being.
13. Sopher, D.E.(1980), An Exploration of India: Cornell University, London.

Course Title: Biogeography

L	T	P	Cr	Marks
4	1	-	4	100

Course Code: GEO.623

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)

Bases: Biogeography, nature, scope, significance, approaches, history, recent developments. Spatial dimension in biogeography, pattern and causes of plant and animal distributions, factors influencing the distribution of life, bio-geographical regions and realms. Historical biogeography, Patterns of life in the past and today. Biodiversity and the source of novelty in life.

Unit II: (15 Lectures)

Biogeography and Ecosystem. Definition, scope and significance of biogeography; Basic ecological principles; Geo-biochemical cycles: carbon, nitrogen, oxygen and phosphorus cycles; Biome and biomass; World distribution of plants and animals; Biodiversity: depletion and conservation.

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: Gender Geography

L	T	P	Cr	Marks
4	1	-	4	100

Course Code: GEO.624

Course Description:

The course describes approaches, movement and development of gender geography. It also highlights the gender dimension of social differentiation and role of women in the development processes and environmental management.

Unit I (15 Lectures)

Feminism and feminist movement, Feminist epistemology, scope, nature and development of gender geography.

Unit II: (15 Lectures)

Quality of life among female in the developed and developing countries; sex-ratio and child and maternal mortality rate, Literacy and education; Status of females in the society in Development and Developing countries with special reference to India.

Unit III: (11 Lectures)

Gender and Work: Historical developments in the sexual division of labour, Crime against women with special reference to domestic violence; Participation in economic activities: Primary, Secondary and Tertiary Sector, Domestic work and its significance.

Unit IV: (15 Lectures)

Empowerment of women: education, economic opportunities, access to health services; Involvement in decision making processes from local bodies to parliaments: Role of women in development, environmental management and disaster management.

Suggested readings:

1. Boserup, E. 1989, Women’s Role in Economic Development Earthscan, London.
2. Dankelman, I & Davidson, J. 1989, Women and environment in the Third world, Earthsan, London.
3. Deblig, H,J. 1996, Human geography-Culture, society and space (5thedition), John Wiley, New York.
4. Johnston, R.J. et, al (eds), 1996. The health of women, A global respective, Westview press, Boulder.
5. Koblinsky, M.et. Al (eds), 1993. The health of women-A global respective, Westview press, Boulder.
6. Lee, D, 1988. Women in geography –A Comprehensive Bibliography, Boca Raton, Florida.

Course Title: Geography of Health and Well-being

L	T	P	Cr	Marks
4	1	-	4	100

Course Code: GEO.625

Course Description:

This course examines the geographical dimension of Human health and wellbeing, major diseases and domestic public health issues. It also includes integration of GIS in health and infrastructure mapping and spatial analysis in GIS.

Unit I (15 Lectures)

Basic Concepts, Scope and significance of Health, Disease and Wellbeing; Approaches to the Study of Health Geography: Ecological, Social and Spatial; Approaches to the Study of Wellbeing: Need-based, Relative standard and capability; Geographical factors affecting Human Health and Wellbeing.

Unit II: (15 Lectures)

WHO Classification of Diseases and their Major Types: Genetic; Communicable and Non-communicable; Occupational and Deficiency Diseases; Epidemics and Pandemic.

Unit III: (11 Lectures)

Ecology, Etiology, Diffusion and Distribution Pattern of Malaria, Tuberculosis, Hepatitis, AIDS, Glycemia and Cardiovascular Diseases; Poverty; Food Security; Nutrition Deficiency; Health and Sanitation Facilities.

Unit IV: (15 Lectures)

Role of WHO, UNICEF, Red Cross; Indian Health Care Planning: Child and Family Health Welfare, Immunization, Rural Health and Health for All Programmes, National Health Care Infrastructure; Health GIS.

Suggested readings:

1. Cliff, A. & Haggett, P. (1989). Atlas of Disease Distribution, Basil Blackwell, Oxford.
2. Digby, A, & Stewart, L. (eds.) (1996). Gender, Health and Welfare, Routledge, New York.
3. Fouberg, E.H., Murphy, A.B., H. J. de Blij. (2009). Human Geography: People, Place, and

- Culture, Wiley and Sons, Eagle Lake.
- Hardill, I., Graham, D.T., Kofman, E. (2001). Human geography of the UK: an introduction, Routledge, N.Y.
 - Hazara, J. (ed) (1997). Health Care Planning in Developing Countries, University of Calcutta, Kolkata.

Additional readings:

- Knox, P.L. (1975). Social Well-being: A Spatial Perspective, Oxford University Press
- Learmonth, A.T.A. (1978). Patterns of Disease and Hunger, a Study in Medical Geography, David and Charles, Victoria.
- May, J.M. (1970). The World Atlas of Diseases, National Book Trust, New Delhi

Course Title: Environmental Planning and Management

L	T	P	Cr	Marks
4	1	-	4	100

Course Code: GEO.626

Course Description:

The course gives introduction to the components of environment and environment crisis. It includes various approaches and tools of environmental planning and management.

Unit I (11 Lectures)

Fundamental concepts:

Concept of environment; Components of environment; Environment: Life support system, resource field and pollution sink; Ecosystem: Concept, nature, components, functions and types.

Unit II: (15 Lectures)

Environmental Crisis and Problems:

Human-environment interaction: Environment and technology; Local, regional and global environmental problems; Interconnections of these environmental problems; Environmental degradation and pollution and depletion and degradation of resources.

Unit III: (15 Lectures)

Environmental Planning and Management:

Planning and management: Concepts, functions, approaches and processes; Environmental planning: Theory and process; Environmental management: Steps and process; International commitments and national legal framework of environmental planning and management.

Unit IV: (15 Lectures)

Approaches and tools of environmental management:

Approaches to environmental planning and management: Risk, restoration and holistic; Scales of planning and management: Small community, urban, watershed and ecoregion; Tools: EIA, GIS, Remote sensing.

Suggested readings:

- Ahmed, A. (1999). Social Geography, Rawat Publication, Jaipur.
- Carter, John and Jones, T.(1989), Social Geography: An Introduction to Contemporary Issues, Edward Arnold, London.
- Chandana R.C.(1989), Spatial Dimensions of Scheduled Castes in India, Intellectual Publishers

- House, New Delhi.
4. Crane, R.I.(1973), Regions and Regionalism in South Asia Studies: An Exploratory Study, Durham, Duke University.
 5. D.M. Smith (1995), Geography and Social Justice, Black-well.

Additional readings:

1. Dube, S.C. (1991). Indian Societies, National Book Trust of India, New Delhi.
2. Dube, S.C, Tribal Heritage of India, Vias Publishing Co, New Delhi.
3. Ghurye,G.S.(1963), The Scheduled Tribes, Bombay, Popular Prakashan.
4. Guha, B.S.(1944), Racial Elements in Indian Population, Oxford University Press, Bombay.
5. Knox,P.(1982), Urban Social Geography:An Introduction, Longman, London.
6. Konx, P.L.(1975), Social Well –being: A Spatial Perspective, Oxford London.
7. Manson, P., “Unity and Diversity: An Introductory Review” in P, Manson (ed.) India and Ceylon: Unity and Diversity pp. 1-19.
8. Morris, D. et. Al.(1982), Measuring the Condition of India’s Poor: The Physical Quality of life index, Promila, New Delhi.
9. Sakharov,IV.(1971), “Ethno Linguistic Geography of India. Facts and Problems”, In Economic and Socio-cultural Dimensions of Regionalization, Census of India, Monograph.No.7.
10. Singh, K.S.(1985), Tribal Society in India, Manohar.
11. Smith, D.M.(1977), Human Geography: A Welfare Approach, Edward Arnold.
12. Smith D.M., Geography of Social Well Being.
13. Sopher, D.E.(1980), An Exploration of India: Cornell University, London.

Optional courses II: Select any one special group based on specialisation:

Group A

Course Title: Population Geography

Course Code: GEO.627

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 (10 Lectures)

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

Unit II: (10 Lectures)

Migration: Concepts, pattern, determinants and consequences of migration and issues related to migration, Concept of mobility and migration, sources and quality of data, types of migration, census definition of migrants and its limitations; Migration theories: Ravenstien and Everetts Lee.

Unit III: (12 Lectures)

Spatial Distribution and Urbanisation: Spatial distribution: importance and pattern, factors affecting spatial distribution of population: physical, economic, social factors and Govt. policies. Urbanization definition and Importance; Important aspects of urbanization process-level; Forces of urbanization

and components of urban population growth in developing countries, over urbanization phenomena and urban primacy, Major urbanization problems and policies in developing countries with focus on India.

Unit IV: (12 Lectures)

Population Estimates and Projections: Concepts of population projections; population estimates, forecasts and projections, uses of population projections. Methods of interpolation; extrapolation using linear, exponential, polynomial, logistics, Gompertz curves.

Unit V: (12 Lectures)

Population and Development: Concepts of development and measures; Theories of development: Arthur Lewis's two-sector model; big push theory, Liebenstein's critical minimum effort theory, Harrod-Domar and Solow's growth models. Development strategies through the different five year plans. Millennium development goals and achievements with special reference to India.

Suggested readings:

1. Cohen, Robin, (1996). Theories of Migration, The International Library of Studies on Migration, Edward Elgar, Cheltenham
2. Eduardo Arriaga, (1975). "Selected Measures of Urbanization", in Sydney Goldstein and David Sly (Eds.) Measures of Urbanization and Projections of Urban Population, IUSSP Belgium.
3. Government of India (2006). Population Projections for India and States, 2001-2026. New Delhi: Office of the Registrar General.
4. Haq, Mahbubul (1996). Reflections on Human Development, Delhi: Oxford University Press. Chapters 1 & 2.
5. Jones, H. R. (2000). Population Geography. 3rd edition. Paul Chapman, London. Navaneetham Kannan and George Groenewold, (1998): The Projection of Populations: Data Appraisal, Basic Methods and Applications, Population and Sustainable Development Teaching Texts, Thiruvananthapuram: Centre for Development Studies.

Additional readings:

1. Poston, D. L. and Michael, M. (2005). Handbook of Population, Springer Heidelberg, Germany.
2. Ray, Debraj (1998). Development Economics. Delhi: Oxford University Press. Chapters 3 & 4.
3. Sen, Amartya, (2002). The concept of development in Chenery Hollis and T.N. Srinivasan (eds), Handbook of Development Economics Vol. 1. Amsterdam: Elsevier. Chapter 1.
4. United Nations Development Programme (2006). Human Development Report 2006, New Delhi: Palgrave Macmillan Technical Note 1. pp. 393-99.
5. Zelinsky, W., Kosinski, L. A. and Prothero M. R. (eds.) (1970). Geography and a Crowding World. Oxford University Press, New York and Oxford.
6. Zelinsky, W. (1966). A Prologue to Population Geography. Prentice Hall, Englewood Cliffs, New Jersey.

Course Title: Advanced Population Geography- Practical

L	T	P	Cr	Marks
-	-	4	2	100

Course Code: GEO.628

Course Description:

The course describes various methods and techniques of representing population distribution, concentration and migration. Through this course students will also learn software modules for statistical data handling and analysis.

Unit I

Population growth of India and the world using arithmetic and semi-log scales; Population distribution map of India using dot and sphere/circle, cubes, combined; Density map of India by Choropleth; Age-sex structure of rural-urban population of India by Superimposed pyramid; Literacy Level by Compound pyramid; Occupational structure of India by Divided rectangle; Fertility, mortality and natural growth of population by Polygraph.

Unit II:

Population potential map by Isopleth; Scatter diagram; Life table calculation; Computation of HDI for India; Migration by Flow diagram; Centographic analysis of population growth; Measurement of population concentration by cumulative curve. Population projection.

Unit III:

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.

Suggested readings:

1. SPSS advanced models 14.0 - SPSS Inc.
2. Stata user's guide: Release 10., 2nd Edition. Stata Press.
3. Stata survey data reference manual: Release 8., 2nd Edition. Stata Press.
4. Cromley, Ellen K. and McLafferty, Sara L., (2002): GIS and public health. Guilford Press, New York.

Group B

Course Title: Fundamentals Of Photogrammetry

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. Lillesand 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: Fundamentals Of 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.

Group C

Course Title: Geography of Rural Settlement and Planning

L	T	P	Cr	Marks
4	1	-	4	100

Course Code: GEO.631

Unit I

(12 Lectures)

Bases, Evolution and Models. Nature, scope, definition and significance of Rural Settlement Geography; Human settlement as a system; Concepts and characteristics of rural settlements; Theories and models of settlement diffusion: Eric Bylund (Sweden), Gunnar Olsson (Sweden), David Grossman (Nigeria), John Hudson (USA), Contributions of Banaras School.

Unit II:

(12 Lectures)

Spatiality and Histogenesis. Evolution and growth of rural settlements and their causes: Old and New Worlds; Siting and location of rural settlements; Distribution, spacing, and nature of dispersion; Types and patterns; Morphology of village: examples from Germany, Japan, Israel, African countries; Rural-service centres: nature, hierarchy, service area, and interaction.

Unit III:

(10 Lectures)

Rural Dwellings. Traditional and folk rural house types: origin, evolution and characteristics; Typology based on building materials, plans, uses and architectural style; House types and their characteristics in different geographical environments: Monsoon Asia and Arid zone.

Unit IV:

(12 Lectures)

Indian Village. Evolution and multiplicity; Regional morphological characteristics; Morphological interaction models: religio-ritual, secular-economic, and sacred-economic interlocking system; Transformation and planning of Indian village: models and plans.

Unit V:

(10 Lectures)

Meaning, concept and scope of rural development and planning; rural development: Approaches, policies and paradigms; Basic infrastructures for rural development; People's participation in rural planning and rural industrialisation.

Suggested readings:

1. Eidl, R. C., Singh, K. N. and Singh, Rana, P.B., (eds.) (1977): Man, Culture and Settlement. Kalyani Publishers., New Delhi.
2. Ghosh, S. (1999): A Geography of Settlements. Orient Longman, Kolkata.
3. Hudson, F. S. (1976): A Geography of Settlements. MacDonald and Evans, New York.
4. Mitra, A. (1960): Report on House Types and Village Settlement Patterns in India. Publication Division, Govt. of India, New Delhi.
5. Mosley, M.J. (2005): Rural Development: Principles and Practice. Sage Publication, London.

Additional readings:

1. Oliver, P. (1987): Dwellings. The House across the World. University of Texas Press, Austin.
2. Rapoport, A. (1969): House, Form and Culture. Prentice-Hall, Inc., Englewood Cliffs, NJ.
3. Rykwert, J. (ed.) (2004): Settlements. University of Pennsylvania Press, University Park, USA.
4. Singh, R.L. (eds.) (1973): Rural Settlements in Monsoon Asia, National Geographical Society of India, Varanasi.
5. Singh, R. L., Singh, K.N. and Singh, Rana P.B., (eds.) (1975): Readings in Rural Settlement Geography, National Geographical Society of India, Varanasi.
6. Singh, R. L. and Singh, Rana P. B. (eds.) (1978): Transformation of Rural Habitat in Indian Perspective, National Geographical Society of India, Varanasi, Pub. 19.
7. Singh, R.L. and Singh, Rana P.B., (eds.) (1979): Place of Small Towns in India. National Geographical Society of India, Varanasi,
8. Singh, R.L., Singh, K.N and Singh Rana P.B., (eds.) (1976): Geographic Dimensions of Rural Settlements. National Geographical Society of India, Varanasi,
9. Singh, Rana P.B. (1977): Clan Settlements in the Saran Plain, National Geographical Society of India, Varanasi,
10. Singh, Rana P.B. and Singh, R.B. (1981): Changing Frontiers of Indian Village Ecology. National Geographical Society of India, Varanasi, Pub. 27.
11. Singh, R.Y. (2005). Geography of Settlements. Rawat Publications, Jaipur and New Delhi.
12. Singh, S.B. (1977). Rural Settlement Geography. U.B.B.P., Publications, Gorakhpur.
13. Tiwari, R. C. (2000). Settlement Geography; in Hindi. Prayag Pustak Bhawan Allahabad.
14. Wanmali, S. (1983). Service Centres in Rural India. B.R. Publications Corporation, New Delhi.
15. Wood, M. (2005). Rural Geography: Processes, Responses and Experiences of Rural Restructuring. Sage Publication, London.

Course Title Geography of Rural Settlement and Planning -Practical

L	T	P	Cr	Marks
-	-	4	2	100

Course Code: GEO.632

Unit I

Spatial Systems. Size classification of rural settlements by scatters diagrams; Rural settlement distribution and types in India; Density functions and pattern analysis of distribution of settlements: randomness and spacing indices, Testing Christaller's theory; Theoretical models of rural settlements and testing of different models.

Unit II:

Studies from India. Typological classification of rural settlements from maps; Rural service centres: indices, hierarchy, classification and ordering; Mapping the morphology of Indian villages; Planning of Indian villages: models, plans and case studies.

Unit III:

Rural Planning. Rural land use maps (India and UK); International colour scheme and its applicability in Indian context; Intensive rural land use survey and application of locational theories; Land capability: its determination and mapping; Sample field mapping and planning of land use in given rural areas.

Group D

Course Title: Geography of Disaster

L	T	P	Cr	Marks
4	1	-	4	100

Course Code: GEO.633

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 gulying, coastal erosion causes, assessment, effects and control measures.

Unit III: (12 Lectures)

Natural hazards – hydrological – floods (river and seawater), failure of natural dams, Tsunamis, Salinization, causes, assessment, effects and control measures. Risk and vulnerability assessment hazard zonation, Use of remote sensing and GIS in hazard studies.

Unit IV: (12 Lectures)

Man-made disaster: Fire, Terrorism, Food poisoning, strike and lockouts, accidents, fair and festivals, stampedes.

Unit V: (10 Lectures)

Impacts of Disasters: Social, Economic, political, environmental, health, psychological; Differential impacts: Caste, class, gender, age, location, disability.

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.634

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.

Semester-IV

Course Title: Fundamentals of GIS and GPS

L	T	P	Cr	Marks
4	1	-	4	100

Course Code: GEO.605

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.
 21. Worboys, M. F. (1995): GIS: A Computing Perspective. Taylor and Francis, London.

Course Title Fundamentals of GIS -Practical

L	T	P	Cr	Marks
-	-	4	2	100

Course Code: GEO.606

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.

GEO.700	Dissertation/Project activities and Viva voce	work/Academic	-	-	-	10	300
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Optional courses: Select any one special group based on specialisation from the followings:

Group A

Course Title: Gender, Health and Development

L	T	P	Cr	Marks
4	1	-	4	100

Course Code: GEO.634

Unit I

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:

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:

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:

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.

Unit V:

Case of India: Characteristics of population: age-sex structure, rural-urban, literacy, work force and occupational structure; National population policy.

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/WHD/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.635

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.636

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

Introduction to Digital Image Processing & Information Extraction

Unit II:

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

Unit III:

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 IV:

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

Unit V:

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.

- Floyd, F. and Sabins, Jr. (1986): Remote Sensing: Principles and Interpretation. W.H. Freeman, New York.

Additional readings:

- Gautam, N.C. and Raghavswamy, V. (2004): Land Use/ Land Cover and Management Practices in India. B.S. Publications., Hyderabad.
- Harry, C.A. (ed.) (1987): Digital Image Processing. IEEE Computer Society, California.
- Hord, R.M. (1982): Digital Image Processing of Remotely Sensed Data. Academic Press, New York.
- Jensen, J.R. (1986): Introductory Digital Image Processing: A Remote Sensing Perspective, Prentice-Hall, Englewood Cliffs, New Jersey.
- Jensen, J.R. (2004): Remote Sensing of the Environment: An Earth Resource Perspective. Prentice-Hall, Englewood Cliffs, New Jersey. Indian reprint available.
- Lillesand, T.M. and Kiefer, R.W. (2000): Remote Sensing and Image Interpretation. John Wiley and Sons, New York.
- Nag, P. (ed.) (2000): Thematic Cartography and Remote Sensing. Concept Publishing Company, New Delhi.
- Nag, P. and Kudrat, M (1998): Digital Image Processing, Concept Publishing Company, New Delhi.
- Rampal, K.K. (1999): Handbook of Aerial Photography and Interpretation. Concept Publishing Company, New Delhi.
- Reeves, R.G. (ed.) (1983): Manual of Remote Sensing, Vols. 1 and 2. American Society of Photogrammetry and Remote Sensing, Falls Church, Virginia.
- 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.
- Siegel, B.S. and Gillespie, R. (1985): Remote Sensing in Geology. John Wiley and Sons, New York.
- 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.637

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)

Group C

Course Title: Geography of Urban System and Planning

L	T	P	Cr	Marks
4	1	-	4	100

Course Code: GEO.638

Unit I

Bases. Meaning, scope and recent trends in urban geography; Urban population: characteristics, processes and trends of urbanisation; Methodology in urban studies; Origin and evolution of urban settlements; Distribution of urban centres.

Unit II:

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

Unit III:

Spatiality and Models. Size and spacing of cities: Rank-size rule; Law of the primate city; Urban hierarchies; Central Place Theory (Christaller and Lössch); Urban land use and functional morphology: functional areas and Peri-urban areas; Theories of urban structure (Burgess, Hoyt, Harris and Ullman, Mann, White).

Unit IV:

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.

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, Pergamon 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: Geography of Urban System and Planning -Practical

L	T	P	Cr	Marks
-	-	4	2	100

Course Code: GEO.639

Unit I

Global Perspective. Theoretical models of urban growth, infrastructure, community zone based study of maps; Functional interpretation of urban morphology and town plan through the ages; Functional classification of towns based on occupational data, population size and centrality.

Unit II:

Indian Perspective. Structural and growth analysis of Indian cities and conurbations; Determination of urban hierarchy in Indian region; Determination of population density gradient in urban areas; Application of rank-size rule in a selected area of India; Urban survey and mapping of functional areas of cities.

Unit III:

Urban Planning. Preparation of urban land use maps from topo-sheets; Diagrammatic representation of internal structure of urban centres based on traditional theories; Examination of Master Plans of towns from different areas; Planning a new town (considering urban land use), neighbourhood and community centre plan; Preparation of redevelopment and development sketch plan.

Group D

Course Title: Disaster Preparedness and Management

L	T	P	Cr	Marks
4	1	-	4	100

Course Code: GEO.640

Course Description:

This course examines the various phases of disaster management: prevention, preparedness, and management. It also explores disaster profiles of India, disaster management mechanism in India, process of disaster management and use of GIS and Remote Sensing in mitigation and preparedness.

Unit I

Disaster Profiles of India: ii. Regionalization of Disasters in India: Earthquake and Landslide iii. Regionalization of Disasters in India: Flood, Drought and Cyclone. Case study: Earthquakes in Western Himalayas, North-east India and Gujarat, Landslides in Himalayas and Western Ghats, Avalanches in Western Himalayas, Floods in Ganga Basin and Floods in Punjab, Cyclones in Bay of Bengal and Arabian Sea.

Unit II:

Disaster Management Mechanisms In India: Institutional Framework of Disaster Management in India, Stakeholders in Disaster Management, National/Central Level Management: Nodal Agencies iv. National Disaster Management Authority.

Unit III:

Disaster management: Disaster cycle Preparedness & Mitigation; **Phases of disaster cycle:** i. Factors of Disaster Management.ii. First Aid. iii. Role of Civilians and NGO'S in Natural & man- made Calamities. iv. Home guard. v. Role of Armed forces in Natural man- made Calamities. vi. Role of Para-Military forces in Natural man- made Calamities. vii. Role of Police forces in Natural man- made Calamities.

Unit IV:

Technologies for Disaster Management: Role of IT in Disaster Preparedness; Application of Modern Technologies for the Emergency communication. Application and use of ICST for different disasters.

Unit V:

RS & GIS in Disaster Mitigation and Preparedness: xii. Geoinformatics Perspective in Disaster Management xiii. Satellite Data Requirements for Disaster Management xiv. RS & GIS in Disaster Mitigation: Hazard Analysis and Mapping; Risk and Vulnerability Assessment xv. RS & GIS in Disaster Preparedness: Monitoring and Forecasting; Warning and Evacuation

Suggested readings:

1. Heywood, I. (2010). Connelius, S. and Carver, S., An Introduction to Geographical Information Systems, Pearson Education Limited, United Kingdom.
2. Lillesand, T.M.; & Kiefer, R.W. (1994). Remote Sensing and Image Interpretation, Third Edition, John Wiley and Sons
3. Roy, P.S.; Van Westen, C.J.; Jha, V.K.; Lakhera, R.C. and Champati Ray, P.K. (2000). Natural Disaster and their Mitigation: Remote Sensing and Geographical Information System Perspectives, IIRS, Dehra Dun, Govt. of India.
4. Smith, K. and D. N. Petley (2009). Environmental Hazards: Assessing Risk and Reducing Disaster, 5th Edition, New York: Routledge.

Additional readings:

1. Chandel, Vishwa. B. S. and Brar, K. K. (2011). Multi-Disaster Risk and Vulnerability in Western Himalayan State of Himachal Pradesh. Punjab Geographer, 7, 9-19.
2. Chandel, Vishwa. B. S. and Brar, K. K. (2010). Climatic Extremes and Changing Climate in Western Himalayas: A Study of Cloudburst Incidences in Himachal Pradesh. Punjab Geographer, 6, 29-40.
3. Chandel, Vishwa. B. S.; Brar, K. K. and Chauhan, Y. (2011). RS & GIS Based Landslide Hazard Zonation of Mountainous Terrains: A Study from Middle Himalayan Kullu District, Himachal Pradesh, India. International Journal of Geomatics and Geosciences, 2(1), 121-132. 2011. Available online at: <http://ipublishing.co.in/jggsvol1no12010/voltwo/EIJGGS3011.pdf>
4. Chandel, Vishwa. B. S. and Brar, K. K. (2010). Seismicity and Vulnerability in Himalayas: the case of Himachal Pradesh, India. Geomatics, Natural Hazards and Risk, 1(1), 69–84. Available online at: <http://www.springerlink.com/content/2860664656505556/fulltext.pdf> Smith, K.

(2001). Environmental Hazards: Assessing Risk and Reducing Disaster, Routledge.

Course Title Disaster Preparedness and Management -Practical

L	T	P	Cr	Marks
-	-	4	2	100

Course Code: GEO.641

Course Description:

The course will give understanding of the satellite images and use of RS and GIS techniques for hazard zonation.

Unit I

RS & GIS in Disaster Mitigation and Preparedness: Geoinformatics Perspective in Disaster Management, Satellite Data Requirements for Disaster Management, RS & GIS in Disaster Mitigation: Hazard Analysis and Mapping; Risk and Vulnerability Assessment, RS & GIS in Disaster Preparedness: Monitoring and Forecasting; Warning and Evacuation.

Unit II:

Understanding Maps; Understanding Satellite Imageries; Knowing GIS Software (ARC GIS): Some Basic Operations; Hazard Zonation Using RS & GIS; RS & GIS Applications: xvi. Landslide Hazard Assessment and Monitoring xvii. Seismic Hazard Assessment and Monitoring xviii. Flood Hazard Assessment and Monitoring xix. Drought Hazard Assessment and Monitoring xx. Forest Fire Hazard Assessment and Monitoring.