

As Per NEP 2020

University of Mumbai



Title of the program

- A- P.G. Diploma in Geography
- B- M.A. / M.Sc. (Geography) (Two Year) } **2023-24**
- C- M.A. / M.Sc. (Geography) (One Year) -**2027-28**

Syllabus for

Semester – Sem I & II

Ref: GR dated 16th May, 2023 for Credit Structure of PG

(As per NEP 2020)

PREAMBLE

1. Introduction:

Geography is interdisciplinary subject that integrates natural sciences and social science to create an interface for both the streams to converge and produce an integrated sphere of knowledge.

Geography has yet another unique dimension and that is the application of Geospatial technologies. So broadly the sub disciplines of Geography introduced in the department have been grouped under four heads :

- Physical Geography,
- Human Geography,
- Interface of Physical and Human Geography and
- Geospatial technology

The Masters of Arts and Masters of Science in Geography offers combination of sub disciplines belonging to these four categories. The choices are given to students to select various papers under these categories.

Sub disciplines of Physical Geography is largely based to study:

- Various earth systems and processes.
- Various astrophysical and geological processes that produces and shapes the features of earth.
- Evolution of atmospheric, environmental, oceanic and terrestrial systems and study genesis and development of various land forms, oceanic currents and ecosystems in general.
- The changes and transformations in natural elements and assess their impact on life.
- Natural disasters – their mitigation, adaptation and propose resilience measures.

Sub disciplines of Human Geography helps:

1. To understand the interaction and interconnectedness between the physical world and human response, i.e. to understand the man and environment relationships and how these relationships produce different human landscapes and cultures.
2. To explore the spatial organisation of economy at local, regional, national and international levels and its interconnectedness to grasp the spatial patterns of development and underdevelopment
3. To identify various forces and processes that shape society, culture and people and analyse the resultant socio-spatial impacts across cross sections of society through gender, ethnicity, regional identities and so on.
4. To investigate the very nature of political processes shaping human life, civic sense and political life. Geopolitics and international relations would be another area where students are expected to have deliberations.
5. The study of spatial variation of settlements such as urban, rural and rurban settlements and spaces, their demographic features and population studies, social relations and cultural settings.
6. To study the processes of exclusion, marginalisation, polarisation at social, societal, political and economic levels
7. To suggest various planning and policy measures at regional, local and national level
8. To analyse the impact of media, telecommunication, etc. on society
9. To inculcate the comprehensive understanding of human systems and encourage to arrive at appropriate suggestions

Interface of Physical and Human Geography

1. To understand the impact of anthropogenic interventions on earthen systems like environment, atmosphere, etc. and resources like water, energy and so on
2. To track the evolutionary development of various resources, factors and processes that impact the state of resources and their connectedness with the social wellbeing
3. To strike for equitable efficient, optimum utilisation and distribution of resources
4. To promote the values of sustainable and eco-friendly pattern of production, consumption and distribution

Geospatial technology

1. Application of GIS and Remote sensing in providing technological solutions in efficient management of the resources
2. Using Geospatial technologies in management of various urban civic facilities like infrastructure, transport, waste management, etc.
3. Application of GIS in safety and security of spaces
4. Application of E-Governance and smart technologies for smoother and faster administration
5. Digitisation of resources to manage and monitor resources in a careful manner, for example, forest resources, water resources can be easily counted with the help of technology.

The holistic approach in learning, research and solution provision, provided by Geography has become a key to resolve several persisting issues in the society. Keeping in mind, the central role geography would play in near future the department has planned Masters in Geography with specialisations in following broad categories

- A. Physical Geography and the earth Systems - I
- B. Urban and Regional Planning and Development - I
- C. Climate Change and Sustainability Studies - I
- D. Human Geography and human Ecology - I
- E. Geospatial Technology - I

2. Aims and Objectives:

The University of Mumbai is committed *to always remain inclusive and quality conscious, and with deep conviction that knowledge not only improves the quality of life, but leads to good character, to capitalize on our inherent advantages to generate skilled manpower for nation building through excellent teaching, attracting talent, fostering creativity, research, and innovation.*

The Department of Geography offers two-year M.A.(Geography) and M.Sc.(Geography). The Vision and Mission of the discipline specific outcomes following the larger aims and objectives are:

- Culminating the integrated understanding of Place, Space and Time through *Integrating classroom teaching, laboratory exercises, and study tours to correlate the theoretical phenomenon with ground reality by fieldwork.*
- Geography being an interdisciplinary subject offers knowledge, understanding and output that is integrated and Interdisciplinary in nature that includes the branches of specialization in physical and social sciences.
- Quality, inclusive and focused education through
 - Research – Economy, Society, Ecology and Environment
 - Sensitization and skill/capacity building
 - Environmental, socio-cultural, economic and political understanding to nurture finest professionals and individuals through participation in various academic, extra and co-curricular activities

- Technical and applied Courses on Remote sensing, Geo-informatics and advanced quantitative techniques to provide technological solutions to current social, economic and environmental problems

3. Learning Outcomes:

Students who complete the course will understand the following

- The students will attain professional skills required in the industry, research, and academia.
- To contribute to the larger welfare of society at local, regional and national levels by addressing the national issues.
- The students will develop holistic thinking and scientific approach in professional and personal spheres of life.
- Inculcating universal values and ethics, professionalism and rational approach through the most appropriate curriculum

4. Any other point (if any):

- During the course work students will be provided hands on training on vital skills of land survey, Cartography, remote sensing and GIS in terms of technological acquaintances which will create opportunities for them in terms of employment opportunities. Students will be sent for on-job training for acquiring the professional skills.
- Students would also work with government / public institutions and administrative offices, non-governmental organization and other such institutions on various social, economic, political issues, problems and solutions as a part of on-job training.
- Students will be provided internship at various industries, non-governmental organisations and public and administrative institutions and so on.
- The curriculum is designed in such a manner that the students would earn 34 credits for specialization out of total 88 credits.
- Collaborate with national and international educational and research institutions, non-governmental organisations, researchers/industries for the development of high-end new generation technologies like AI.
- **The postgraduate programs M.A. (Geography) and M.Sc. (Geography) in regular mode are equivalent.**

5. Credit structure of the program (Sem I, II, III & IV)

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Post Graduate Programs in University

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Year (2 Yr PG)	Level	Sem. (2 Yr)	Major		RM	OJT / FP	RP	Cum. Cr.	Degree
			Mandatory*	Electives Any one					
I	6.0	Sem I	GEOG 501 Advanced studies in Physical Geography – I (4*) (TH) GEOG 502 Advanced Studies in Human Geography – I (4*) (TH) GEOG 503 Spatial Dimensions of Development, Environment and Society (4*) (TH) GEOG 505 Geoinformatics (2*) (PR)	GEOG 506 (01 to 11) Specialisations Credits 4 A. Physical Geography and the earth Systems - I B. Urban and Regional Planning and Development - I C. Climate Change and Sustainability Studies - I D. Human Geography and human Ecology - I E. Geospatial Technology - I	GEOG 504 Research Methodology (4*) (PR)			22	PG Diploma (after 3 Year Degree)
		Sem II	GEOG 507 Advanced studies in Physical Geography –II (4*) (TH) GEOG 508 Advanced Studies in Human Geography – II (4*) (TH) GEOG 509 Practical component based on major and electives (4*) (PR) GEOG 511 Advanced Methods of Land Surveying, mapping and cartography (2*) (PR)	GEOG 512 (01 to 11) Specialisations Credits 4 A. Physical Geography and the earth Systems - II B. Urban and Regional Planning and Development - II C. Climate Change and Sustainability Studies - II D. Human Geography and human Ecology - II E. Geospatial Technology - II	GEOG 510 4*		22		
Cum. Cr. For PG Diploma			28	8	4	4	-	44	
Exit option: PG Diploma (44 Credits) after Three Year UG Degree									

II	6.5	Sem III	GEOG 601 Advanced studies in Physical Geography- III (4*) (TH) GEOG 602 Advanced Studies in Human Geography -III (4*) (TH) GEOG 603 Practical component based on major and electives (4*) (PR) GEOG 604 Landuse and land cover Change Detection using Geographic data and Geospatial technologies (2*) (PR)	GEOG 606 Specialisations 4* A. Physical Geography and the earth Systems - III B. Urban and Regional Planning and Development - III C. Climate Change and Sustainability Studies - III D. Human Geography and human Ecology - III E. Geospatial Technology - III			GEOG 605 Dissertation 4*	22	PG Degree After 3-Yr UG
		Sem IV	GEOG 607 Advanced studies in Physical Geography- IV (4*) (TH) GEOG 608 Advanced Studies in Human Geography- IV (4*) (TH) GEOG 609 Practical component based on major and electives (4*) (PR)	GEOG 611 Specialisations - Credits 4 A. Physical Geography and the earth Systems - IV B. Urban and Regional Planning and Development - IV C. Climate Change and Sustainability Studies - IV D. Human Geography and human Ecology - IV E. Geospatial Technology - IV			GEOG 610 Dissertation 6*	22	
Cum. Cr. for 1 Yr PGDegree			26	8			10	44	
Cum. Cr. for 2 Yr PGDegree			54	16	4	4	10	88	

Sign of the HOD

Prof. Sanjukta Sattar
Department of Geography, University of Mumbai

Sign of the Dean

Prof. (Dr.) Anil Kumar Singh
Dean (Interdisciplinary Studies), University of Mumbai

M.A. / M.Sc. (Geography)
Semester I

Subject Code	Course Title	Category	Credits	Hours
GEOG 501	Advanced studies in Physical Geography – I	Mandatory (Theory)	4	60
GEOG 502	Advanced Studies in Human Geography – I	Mandatory (Theory)	4	60
GEOG 503	Spatial Dimensions of Development, Environment and Society	Mandatory (Theory)	4	60
GEOG 504	Research Methodology	Mandatory (Practical)	4	120
GEOG 505	Geoinformatics	Mandatory (Practical)	2	60
	Physical Geography and Earth Systems (Specialisation I)			
GEOG 50601	Watershed Conservation and Management	Elective (Theory)	4	60
GEOG 50602	Coastal Geomorphology	Elective (Theory)	4	60
GEOG 50603	Climate Change and Disaster Management	Elective (Theory)	4	60
	Urban and Regional Planning (Specialisation II)			
GEOG 50604	Urban Spaces: Historical, Sociological and Economic Perspectives	Elective (Theory)	4	60
	Climate Change and Sustainability Studies (Specialisation III)			
GEOG 50605	Climate Change Science	Elective (Theory)	4	60
	Human Geography and Human Ecology (Specialisation IV)			
GEOG 50606	Introduction to Geopolitics and International Relations	Elective (Theory)	4	60
GEOG 50607	Tourism Development and Planning – I	Elective (Theory)	4	60
GEOG 50608	Population and Migration Studies – I	Elective (Theory)	4	60
GEOG 50609	Socio-Cultural Geographies – I	Elective (Theory)	4	60
	Geospatial Technology (Specialisation V)			
GEOG 50610	Earth Observation Science	Elective (Theory)	4	60
GEOG 50611	Cartography - Visualization and dissemination of Geodata	Elective (Theory)	4	60

M.A. / M.Sc. (Geography)
Semester II

Subject Code	Course Title	Category	Credits	Hours
GEOG 507	Advanced studies in Physical Geography – II	Mandatory (Theory)	4	60
GEOG 508	Advanced Studies in Human Geography – II	Mandatory (Theory)	4	60
GEOG 509	Tools and Techniques of Geographical Analysis – I	Mandatory (Practical)	4	120
GEOG 510	On job Training / Internship	Mandatory (Practical)	4	120
GEOG 511	Advanced Methods of Land Surveying, mapping and cartography	Mandatory (Practical)	2	60
	Physical Geography and Earth Systems (Specialisation I)			
GEOG 51201	Remote Sensing and GIS for Water Resources	Elective (Theory)	4	60
GEOG 51202	Fluvial Geomorphology	Elective (Theory)	4	60
GEOG 51203	Earthquake Studies and Seismic Hazard Management	Elective (Theory)	4	60
	Urban and Regional Planning (Specialisation II)			
GEOG 51204	Basic Elements of Urban and Regional Planning	Elective (Theory)	4	60
	Climate Change and Sustainability Studies (Specialisation III)			
GEOG 51205	Sustainability – Ecological, Socio-Economic and Political Dimensions	Elective (Theory)	4	60
	Human Geography and Human Ecology (Specialisation IV)			
GEOG 51206	Geopolitics and South Asia	Elective (Theory)	4	60
GEOG 51207	Tourism Development and Planning – II	Elective (Theory)	4	60
GEOG 51208	Population and Migration Studies – II	Elective (Theory)	4	60
GEOG 51209	Socio-Cultural Geographies – II	Elective (Theory)	4	60
	Geospatial Technology (Specialisation V)			
GEOG 51210	Geo-Information Processing	Elective (Theory)	4	60
GEOG 51211	Applications of Remote Sensing and GIS in Geographical Studies	Elective (Theory)	4	60

Baskets of electives:

Semester	Course Code	Course Name	Credits
I	GEOG 50601	Watershed Conservation and Management	4
I	GEOG 50602	Coastal Geomorphology	4
I	GEOG 50603	Climate Change and Disaster Management	4
I	GEOG 50604	Urban Spaces: Historical, Sociological and Economic Perspectives	4
I	GEOG 50605	Climate Change Science	4
I	GEOG 50606	Introduction to Geopolitics and International Relations	4
I	GEOG 50607	Tourism Development and Planning - I	4
I	GEOG 50608	Population and Migration Studies - I	4
I	GEOG 50609	Socio-Cultural Geographies - I	4
I	GEOG 50610	Earth Observation Science	4
I	GEOG 50611	Cartography - Visualization and dissemination of Geodata	4
II	GEOG 51201	Remote Sensing and GIS for Water Resources	4
II	GEOG 51202	Fluvial Geomorphology	4
II	GEOG 51203	Earthquake Studies and Seismic Hazard Management	4
II	GEOG 51204	Basic Elements of Urban and Regional Planning	4
II	GEOG 51205	Sustainability – Ecological, Socio-Economic and Political Dimensions	4
II	GEOG 51206	Geopolitics and South Asia	4
II	GEOG 51207	Tourism Development and Planning – II	4
II	GEOG 51208	Population and Migration Studies – II	4
II	GEOG 51209	Socio-Cultural Geographies – II	4
II	GEOG 51210	Geo-Information Processing	4
II	GEOG 51211	Applications of Remote Sensing and GIS in Geographical Studies	4

Guidelines and Instructions

1. Kindly refer to the nomenclature used in the curriculum

DSC – Discipline Specific Core	CIE – Class Internal Evaluation
DSE – Discipline Specific Electives	ESE – External Semester Evaluation

- 2. 50 marks Internal (CIE) and 50 External (ESE) evaluations will be done.**
- 3. Students are expected to complete on-job-training as it is a compulsory component under National Educational Policy 2020.**
- 4. Every student need to complete Research project for 10 credits which is a compulsory component under National Educational Policy 2020.**
- 5. There are five broad specialisations. Within each specialization, there are sub-specialisations. Students are expected to select one specialisation in the component of electives. They are expected to complete all four semesters with the same specialization. Within each specialization, students are offered the flexibility of selecting and switching among the sub-specialisation of their choice.**

M.A. / M.Sc. (Geography)

Semester I

Semester I

Title of the Course – Advanced studies in Physical Geography – I								
Year – 1				Semester – I				
Course Type	Course code	Credit Distribution		Credits	Allotted Hours	Allotted Marks		
		Theory	Practical			CIE	ESE	Total
DSC – 1	GEOG 501	04	00	04	60	50	50	100

Course Objectives:

1. To enhance the understanding of the students about geomorphic, atmospheric, oceanographic and hydrologic systems.
2. To make the students understand the interrelations between the various earth systems.
3. To reveal the evolutionary aspects of the lithosphere, atmosphere, oceansphere and hydrosphere.

Course Outcomes:

- CO 1. The students will be able interpret and interconnect the various geologic, atmospheric, oceanographic and hydrologic phenomena.
- CO 2. Understand the history of the ocean, properties of sea water.
- CO 3. Understand and acquire knowledge on waves and tides.
- CO 4. Complete understanding of the calculation of the mean rainfall over basin
- CO 5. Understanding the concepts of rainfall runoff and groundwater

Detailed Syllabus:

Unit 1: The Earth System Science

(15 Hours)

- 1.1 The Earth System Science: The Earth - The origin and the evolution of the earth – big bang theory, formation of lithosphere of the Earth and plate tectonics
- 1.2 The Earth’s interior: structure and composition, seismic waves and exploration for the earth’s interior, deep drilling experiments
- 1.3 Geological time scale, geologic periods and climate change, recently proposed geological epoch (Anthropocene)
- 1.4 Earth’s gravitational field - extent variation in magnitude - GRACE Mission; gravity and its effects on earth systems; Geomagnetism – extent magnitude and variations, dynamo effect, magnetic field reversals and effects

Unit 2: Atmosphere and climate

(15 Hours)

- 2.1 Origin and evolution of structure and composition of the earth’s atmosphere,
- 2.2 Relationship of Climatology with Meteorology, Weather elements and climatic controls
- 2.3 Insolation and heat Budget of the Earth, Temperature - Vertical, horizontal and seasonal variations,
- 2.4 Processes heat energy transfer; Inversion of temperature

Unit 3: Oceanography

(15 Hours)

- 3.1 History of Oceanography- Understanding the ocean beginning with voyaging for trade and exploration, water, and ocean structure.
- 3.2 Ocean water- Thermal properties of ocean water - major dissolved nutrients and gasses, Light and Sound propagation in sea water, sea water and ocean water density.
- 3.3 Wave generation – growth and decay, Classification – factors influencing oceanic waves
- 3.4 Generation of tides – types of tides, tidal constituents.

Unit 4: Hydrology

(15 Hours)

- 4.1 Hydrological cycle – scientific approaches - concept of watershed
- 4.2 Precipitation, Mean rainfall over drainage basin – calculation methods, characteristics of Rain-storm
- 4.3 Rainfall runoff control- Evapotranspiration, infiltration and runoff fluxes
- 4.4 Forms of sub-surface water, saturated formation.

Suggested reading materials:

For UNIT 1 and UNIT 2:

1. Barry, R.S. & Chorley, R.J. (1971). *Atmosphere, Weather and Climate*, ELBS, Methuen & Co. Ltd., U.S.A.
2. Gardner, M. B. (1914). A journey to the earth's interior, or, have the poles really been discovered? *Bulletin of the American Geographical Society*, 46(7), 543.org (Crossref). <https://doi.org/10.2307/200943>
3. Gradstein, F. M. et al. (2014). *The geologic time scale 2012 2-volume set*. Elsevier Science.
4. Griffiths, J. F. (1966). *Applied climatology-an introduction*. Oxford University Press.
5. Karlekar, S. N. (2016). *Terms and concepts in geomorphology, oceanography and climatology: With essential diagrams and illustrations Dimond publication*.
6. Knoll, A. H. A brief history of Earth: Four billion years in eight chapters. *First Mariner Books paperback edition*. Mariner Books. (2023).
7. Lal, D. S. (1997). *Climatology, Sharda pustak Bhawan, Allahabad*.
8. Lefkowitz, R. J., & Yake, J. C. (1976). *Forces in the earth: A book about gravity and magnetism*. Parents' Magazine Press.

For UNIT 3 and UNIT 4:

9. Dingman, S. L. (2015). *Physical Hydrology. 2nd edition, Prentice Hall*.
10. Hawkins, S. J., Allcock, A. L., Bates, A. E., Firth, L. B., Smith, I. P., Swearer, S. E., & Todd, P. A. (2019). *Oceanography and Marine Biology: An annual review. Volume 57*. CRC Press.
11. Hornberger, G. M., Wiberg, P. L., Raffensperger, J. P., & D'Odorico, P. (2014). *Elements of Physical Hydrology*. JHU Press.
12. Singh, V. P. (1992). *Elementary Hydrology*. Pearson College Division.
13. Subramanya, K. (2013). *Engineering Hydrology. Tata Mc-Graw Hill*
14. Todd, D. K., & Mays, L. W. (2007). *Groundwater Hydrology*. John Wiley & Sons.
15. Thurman, H. V. (2011). *Essentials of oceanography*. 10th edition, Prentice Hall. <http://ci.nii.ac.jp/ncid/BB00668465>
16. Vallis, G. K. (2019). *Essentials of Atmospheric and Oceanic Dynamics*. Cambridge University Press.
17. Viessman, W., & Lewis, G. L. (2003). *Introduction to Hydrology*. Pearson.

Title of the Course – Advanced studies in Human Geography - I								
Year – 1			Semester - I					
Course Type	Course code	Credit Distribution		Credits	Allotted Hours	Allotted Marks		
DSC – 1	GEOG 502	Theory	Practical	04	60	CIE	ESE	Total
		04	00			50	50	100

Course Objectives:

1. To study the geography of social, cultural and political processes
2. To understand the evolution of human geography and geographical thoughts and its nature and scope
3. To understand the specific dimension of society in terms of race, language, religion, gender and pattern of their distribution
4. To analyse historical, modern processes that shape cultures, politics and society
5. understanding of implications of globalisation as a major force on economy, society and culture

Course Outcomes:

CO 1. The students are expected to be very well versed with the complex nature of human societies and develop a holistic understanding.

CO 2. Issue based analysis and problem solving approaches would be learned by the students.

CO 3. Student are expected to develop scientific approach through logical and rational thinking

Unit 1 : Changing Perspectives in Human Geography

(15 Hours)

- 1.1 Definitions and fundamental concepts; history of geography – ancient classical, medieval, modern
- 1.2 Major Schools of Geographical Thought – German, French, British, Russian, American; Contribution of Indian geographers
- 1.3 Man-environment relationship – Determinism, Possibilism, Neo-Determinism, Darwinism, cultural and social determinism;
- 1.4 Post-fifty conceptualization of Geographic approaches and methods - Quantitative revolution , Areal differentiation and spatial organization- Hartshorne Schaefer debate, Locational analysis, nomothetic approaches; Models for Geographical Enquiry- Gravity and Spatial interaction Models, Behavioural Models

Unit 2 : Settlement Geography

(15 Hours)

- 2.1 Rural Settlements (types, patterns and distribution) - Contemporary Problems of Rural Settlements - Rural society: caste hierarchy, segregation in rural settlement – rural social morphology – critical understanding of Agricultural Landuse theory - Tribal societies - Transforming rural and tribal societies
- 2.2 Theories of Origin of Towns - Gordon Childe, Henri Pirenne, Lewis Mumford - Urban Systems - the law of the primate city and rank size rule - Central Place Theories - Christaller and Losch - Internal Structure of the City - Models of Urban Land – Classical economic theories on urban landuse
- 2.3 Spatial dimensions of urbanisation - patterns, process and characteristics of urbanisation in changing geographical settings - Changing urban forms - Concepts of Megacities, Global Cities and Edge Cities
- 2.4 Urban planning in India - Five year Plans - Impact of planning on urban and regional settings

Unit 3 : Dynamics of Population Change : Patterns, Processes and spatial distribution (15 Hours)

- 3.1 Components of Population Change – fertility, mortality and associated patterns - Demographic characteristics - developing and developed countries
- 3.2 Population Growth – Attitudes and Interpretations – Malthusian, Neo-Malthusianism and Marxist viewpoint - Critical Understanding of Demographic transition theory – concept of Demographic dividend
- 3.3 Population, Resources and Spatial Pattern of Development - Optimum population, overpopulation and underpopulation – Recent World Views
- 3.4 Migration- early and subsequent migration – scales of migration - Types of migration – Political, cultural and economic dimensions - Contemporary Trends in migration

Unit 4 : Regional Planning (15 Hours)

- 4.1 Concept and Typology of Regions - Formal and Functional Regions - Geographical dimensions of regional development
- 4.2 Theories of Regional Development - Albert O. Hirschman, Gunnar Myrdal, John Friedman, Perroux
- 4.3 Scope and content of Regional planning - Elements of regional planning - Methods of regionalisation
- 4.4 World Regional Disparities -Regional disparities in India - Implications on society and economy

Suggested reading materials:

1. Aitken, S and Valentine, G. (2006), Approaches to Human geography, Sage.
2. Johnston, R.J., Gregory D. Pratt G. and Watts M., (2005, 5th ed.), the Dictionary of Human Geography, Blackwell.
3. Kitchin R., Thrift, N, (eds.) (2009), The International Encyclopedia of Human Geography, Elsevier.
4. Benko, G. and Strohmayer, U. (2004), Human Geography, a History for the 21st Century, Arnold, London.
5. Cloke, P., Crang, P., Goodwin, M., (2004), Envisioning Human Geographies, Arnold.
6. Cloke, P. and Johnston, R., (eds.), (2005), Spaces of Geographical Thought, Deconstructing Human Geography's Binaries, Sage.
7. Atkinson, D., Jackson, P., Sibley, D. and Washbourne, N. (eds.) (2005), Cultural Geography, A Critical Geography of Key Concepts, Tauris, I.B.
8. Norton William, (2002), Human Geography, Oxford, 4th edition
9. Barnes, T. and Gregory, D., 1997, Reading Human geography, Arnold.
10. Smith, D. M. (1977): Human Geography, A Welfare Approach, Arnold
11. Peet, R. (ed) (1987): Radical Geography, Maroufa Press, Rawat, New Delhi, 2003
12. Ambrose, P. G. (1969): Analytical Human Geography, Longman, London
13. De Blij, H. J. (1986): Human Geography, John Wiley & Sons, New York.
14. Vivello, F. R. (1978): Cultural Anthropology, McGraw Hill, USA.
15. Peet R. and Thrift, N. (eds) (1989): New Models in Geography, Vol. I & II, Unwin Hyman.
16. Ahmed, A. (1999). Social Geography, Rawat Publication, New Delhi.
17. Massey, D, Alien, J, P, Jarre, P (eds) (1999): Human Geography Today, Cambridge Polity Press.
18. Harvey, D. (1969). *Explanation in Geography* . Edward Arnold.
19. Johnston, R.J. et.al. (ed.) (1986). *The Dictionary of Human Geography*. Blackwell.

Title of the Course – Spatial Dimensions of Development, Environment and Society								
Year – 1			Semester - I					
Course Type	Course code	Credit Distribution		Credits	Allotted Hours	Allotted Marks		
DSC – 1	GEOG 503	Theory	Practical	04	60	CIE	ESE	Total
		04	00			50	50	100

Course Objectives:

1. The course offers theoretical understanding on various dimensions of development.
2. The present debate vis-à-vis who gets what, where and how is theorised to make students understand the historical backgrounds of the entire process of human development,
3. How development needs to be linked with larger social welfare and ecological preservation would be understood by the students
4. Finally the course would offer the necessities of devising alternate models of development that are people centric and eco-centric.

Course Outcomes:

CO 1. It is expected that students will emerge with a holistic understanding about the interrelation between environment and society leading to specific forms of spatial development.
CO 2. Theoretical and philosophical approaches should be learnt to develop specific perceptions on development.
CO 3. To aware students about various alternative models practices in Global South specifically.

Unit 1: Concept of Development

(15 Hours)

1.1 Economic growth and development - Ingredients and factors- Spatial and aspatial aspects- Concept of underdevelopment.
1.2 Natural resource-access and mobilisation-Technology and society Interrelation- Environment question in development
1.3 Relevance of economic growth theories -Concept of stages of development
1.4 Core-periphery concept - Model of circular and cumulative growth - Growth pole concept - Diffusion and development surfaces - Concept of spread and backwash

Unit 2 : Underdevelopment and patterns of development

(15 Hours)

2.1 Colonialism, neocolonialism and under development - Political economy of growth
2.2 Theories of dependency, Unequal exchange
2.3 Concept of accumulation and uneven development - Relevant examples.
2.4 World Pattern of ‘Creative Destructions’

Unit 3 : Social Theory, Environment and Development

(15 Hours)

3.1 Social theorising of environment - Non-western views, Western views; pre-enlightenment and enlightenment accounts
3.2 views and theories proposed by Thomas Hobbes, John Locke, Rousseau, Malthus, Darwin and Spencer, Kropotkin,
3.3 Marxist social theory and model of socio-historical change, J.S. Mill’s green social thought

3.4 Communities and Sustainability – Tribal, Rural and Urban societies and ethics

Unit 4 : Development, Environment and Society

(15 Hours)

- 4.1 Concept of Environmental Management, relationship between the environment and the economy
- 4.2 General sustainability models, Concepts of sustainability in the global economy
- 4.3 Sustainable development indicators including social dimensions of sustainable development e.g. poverty reduction, gender and development, and social development indicators
- 4.4 Case studies on sustainable development – Case studies – International - Africa, Latin America and Scandinavian Countries - Case studies from India – Mendha lekha model, Hivre Bazar and other relevant case studies

Suggested Reading Materials:

1. Harvey, D. (1982). *The Limits to Capital*. Basil Blackwell.
2. Johnston, R. and Taylor, P. (eds)(1986). *A World in Crisis*. Basil Blackwell.
3. Forbes, O. (1984). *The Geography of Underdevelopment*. The Johns Hopkins University Press
4. Brewer, A. (1980). *Marxist Theories of Imperialism*. Routledge and Kegan Paul.
5. Pacione, M. (1988). *Geography of the Third World*. Routledge.
6. Coates, B. ,Johnston, R. and Knox, P. (1977). *Geography and inequality*. Oxford University Press.
7. Taylor, M. and Thirst, N. (1981). *The Geography of Multinational Corporations*. Vol.I and II. Croom Helm.
8. Banerjee-Guha, S. (1997). *Spatial Dynamics of International Capital*. Orient Longman.
9. Armstrong, W. and McGee, T. (1985). *Theatres of Accumulation*. Methuen.
10. Frank, A. (1978). *Dependent Accumulation and Underdevelopment*. The MacMillan Press. London.
11. Mather, A. and Chapman, K. (1995). *Environmental Resources*. Longman Scientific and Technical.
12. Potter, R., Binns, T, Elliott, J. and Smith, D. (1999). *Geographies of Development*. Longman.
13. Bhaduri, A. (2006). ‘Development with dignity A case for full employment’. National book trust of India.
14. Frank, A. (1975). ‘On capitalist Underdevelopment’. Oxford University Press.
15. Caroline, T. and Peter W. (ed.) (1997). *Globalization and South*. Macmillan Press Ltd.
16. Desai, V. and Potter B. (eds.) (2011). *The Companion to Development Studies*. A Hodder – Viva Edition, London.

Title of the Course – Research Methodology in Geography								
Year – 1			Semester - I					
Course Type	Course code	Credit Distribution		Credits	Allotted Hours	Allotted Marks		
DSC – 1	GEOG 504	Theory	Practical	04	120	CIE	ESE	Total
		00	04			00	100	100

Course Objective:

1. To enable students to comprehend the underlying principles of research in Geography.
2. To familiarize them with different types of data collection and data analysis techniques ,
3. To write the discussion and conclusions, and following of research and publication ethics.

Course Outcome:

- CO 1. After attending this course students will be well-versed in the conduction of research in geography using relevant data and appropriate research techniques.
- CO 2. They will gain expertise in report writing and presenting their research outcomes effectively.

Unit 1 : Introduction to Research Methodology (24 Hours)

- 1.1. Defining research- Methods of research - types - qualitative, quantitative, mixed- Scientific method in geographical studies, inductive and deductive, positive, interpretive and critical
- 1.2. Research Design – Research Problem identification and formulation - selection of research plan – the steps - Conducting Literature review- searching literature, writing the review and identifying research gap
- 1.3 Identifying sources and methods of geographical data collection: collection of a) primary data - preparing questionnaires and schedules, conduction of interviews , FGD b)secondary data- reports, records, literature, newspaper, maps, pictures, audio, video etc. - Scales of measurements: Nominal, Ordinal, Ratio and Interval
- 1.4. Geographic Data analysis: Qualitative, Quantitative and Advanced techniques of geographic data processing and analysis, preparing geographical matrix for data analysis and interpretation.

Unit 2 : Research Hypothesis testing and Sampling (24 Hours)

- 2.1. Meaning and types of hypothesis; Framing of Hypotheses : Problem identification, statement of hypothesis
- 2.2. Hypothesis testing (parametric/non-parametric) – testing for – i) Mean, ii) proportion iii) variance iv) difference of two mean v) difference of two proportion vi) difference of two variances , p -value approach.
- 2.3 Sampling: Meaning & types of sampling - determination of sample size
- 2.4 Sampling Intervals – Level of Significance and level of Confidence

Unit 3 : Use of Quantitative and Qualitative Techniques (24 Hours)

- 3.1 Choice of statistical techniques for data analysis - types of variables - Quantitative, Categorical, experimental and other types
- 3.2 Central tendency - arithmetic mean and weighted mean - Concept of deviation - standard deviation

- skewness and Kurtosis

3.3 Interpretation of visuals and non visual techniques of spatial analysis

a. From various sources: NATMO, and Phillips Atlas, Oxford Economic Atlas and Census Atlas of India, Women and Children Atlas, Atlas of Religion, Historical Atlas of South Asia, Planning Atlas, etc.

b. From documentaries, films, photographs, cartoons as sources of spatio-social data.

3.4 Explanation of qualitative analysis: Ethnographic transcripts, experiential data and narrative data, newspaper and literary data

Unit 4 : Scientific Report Writing and Publishing

(24 Hours)

4.1. Introduction- aim and objectives, data and methodology

4.2. Data analysis, result discussion, conclusion

4.3. Referencing system, weblography and bibliography, plagiarism testing, research & publication ethics,

4.4. Comprehending impact factor, citation, DOI, identifying journals according to journal metrics

Unit 5 : Skill Enhancement

(24 Hours)

5.1 Soft Skill: Academic communication, Presentation skill, Body language

5.2 Computational Skill: MS Office, Adobe, Google workplace

5.3 Software used in Reference management such as Mendeley, Zotero.

5.4 Any two freeware softwares used for research methodology diagram preparation

Suggested Reading Material

1) . Karlekar Shrikant and Kale Mohan (2005). *Statistical analysis of Geographical data*.

Dimond publication

2) Burt, J.E. and Barber, G.M.(1996). *Elementary statistics for Geographers*. The Guilford press.

3) Clark, W.A.V. and Hosking, P.C(1986). *Statistical Methods for Geographers*, John Wiley & Sons.

4) Dickinson, G.C.(1977). *Statistical Mapping and presentation of statistics*. Edward Arnold limited .

5) Ebdon David (1989). *Statistical for Geographers*

6) Geoge Joseph (2003). *Fundamental of Remote Sensing*. Universities Press.

7) Gregory, S.(1963). *Statistical Methods and Geographer* Longman Group Ltd.

8) Kanetkar T. P. &Kulkarni S.V. (1986).*Surveying & leveling*, VidyarthiGrihaPrakshan.

9) Keates, J.S.(1973). *Cartographic design and production* 2nd Edition. Longman group

10) Kothari, C.R. & Garg, G. (2014). *Research Methodology*. New Age International Publishers.

11) Murthy, N. K.L. (2014). *Research Methodology in Geography*. Concept Publishing Company PVT. LTD.

12) Robinson, G.M. (1998). *Methods & Techniques in Human Geography*. John Wiley & Son.

Title of the Course – Geoinformatics								
Year – 1			Semester - I					
Course Type	Course code	Credit Distribution		Credits	Allotted Hours	Allotted Marks		
DSC – 1	GEOG 505	Theory	Practical	02	60	CIE	ESE	Total
		00	02			00	50	50

Course Objectives:

1. Main objective is to learn how to analyze information about the Earth from RS and GIS data with raster and vector data models using specific tools in Geo-Informatics domain.

Course Outcomes:

At the end of the practical course students must be able to practically:

- CO 1. Understand raster and vector data models.
- CO 2. Learn basic algorithms to process raster and vector data models.
- CO 3. Learn to integrate raster and vector data models.
- CO 4. Learn Geo-spatial data processing with Open Source RS and GIS software.
- CO 5. Generate output from Geo-spatial data i.e. maps, tabular data and statistical information.
- CO 6. Design and carry out sequentially Geo-spatial data processing steps.
- CO 7. Understand capabilities of Geo-Informatics.

Unit 1 : Raster Data Analysis:

(30 Hours)

- 1.1 Georeferencing - GCP inputs, assigning projection and datum, resampling methods.
- 1.2 Applications of raster calculator: Arithmetic, relational and logical operations; Calculation of NDVI, land cover extraction from NDVI, raster classification and measurement.
- 1.3 Spatial Interpolation: meaning and methods- IDW, Ordinary Kriging.
- 1.4 Digital Elevation Model Analysis: Prerequisite on datum, projection, spatial resolution; Preparation average rainfall map- Arithmetic mean method, Thiessens polygon method, Isohyetal method- Delineation of River Basin; computation of flow direction, flow accumulation, extraction of streams; computation of land surface parameters; computation of morphometric parameters- elongation and circularity ratio, bifurcation ratio, stream frequency, drainage density.

Unit 2 : Vector Data Analysis:

(30 Hours)

- 1.1 Digitization: preparation of vector layer, shape file, linking attribute data.
- 1.2 Single layer operations: Feature identification, measurement, vector classification, extraction.
- 1.3 Multilayer operation: Data retrieval- Attribute and Spatial query; Point in polygon, Line in polygon, polygon in polygon; Union, intersection, symmetrical difference, update, merge, append and dissolve.
- 1.4 Presenting data: Map Layout and design, map composition.

Suggested Reading Material:

- 1. American Society of Photogrammetry (1983): Manual of Remote Sensing, ASP Palis Church, V.A.
- 2. Agrawal, N.K.(2006), Essentials of GPS (Second Edition), Book Selection Centre, Hyderabad

3. Barrett, E.G. and Curtis, L.F. (1992): Fundamentals of Remote Sensing in Air Photo-interpretation, McMillan, New York. 7.
4. Bernhardsen, Tor (2002): Geographical Information Systems: An Introduction, Third Edition, John Wiley & Sons, Inc., New York.
5. Burrough, Peter A and McDonnell, R.A. (1998): Principles of Geographical Information Systems, Oxford University Press, Mumbai.
6. Clarke, Keith C. (1998): Getting Started with Geographic Information Systems, Prentice-Hall Series in Geogl. Info. Science, Prentice-Hall, Inc. N.J.
7. Dykes, MacEachren & Kraak (eds.) (2005), Exploring Geovisualization
8. Gibson, P. J. (2000): 'Introduction to Remote Sensing - Principles and Concepts', Routledge - Taylor & Francis.
9. Heywood, I. et al (2002): An Introduction to Geological Systems, Pearson Education Limited, New Delhi.
10. Huisman O. and R.A. de By (ed.), 2009: Principles of Geographic Information Systems - An introductory textbook, 4th ed., ITC, ISBN 90-6164-269-5
11. Iliffe, J.C (2006), Datums and Map Projections for Remote Sensing, GIS and Surveying, Whittles Publishing, New York.
12. Jonson. R. J. (2003): Remote Sensing of the Environment-An Earth Resources Perspective, Pearson Education Series in Geographical Information Science, Keith C. Clarke (Series editor) Pearson Educators Private Limited. (Singapore), New Delhi.
13. Joseph, G. (2009): Fundamentals of Remote Sensing, Universities Press (India) Pvt. Ltd., Hyderabad.
14. Kang-tsung Chang (2017) Introduction to Geographic Information Systems, McGraw Hill Education; 4th edition
15. Klaus Tempfli, Norman Kerle, Gerrit C. Huurneman, Lucas L. F. Janssen (2009) Principles of Remote Sensing, An introductory textbook, ITC, University of Twente, Enschede, The Netherlands.
16. Krygier & Wood (2005) Making maps: a visual guide to map design for GIS
17. Russ, J. C. (1992): The Image Processing Handbook, CRC Press SIUE Library call #: TA1632.R88 (reference).
18. MacEachren (1995), How map work
19. Menno-Jan Kraak and Ferjan Ormeling (2020) CARTOGRAPHY: Visualization of Geospatial Data, CRC press.
20. Michael N. DeMers (2009) Fundamentals of Geographic Information Systems, John Wiley & Sons.
21. Paul A. Longley, Michael F. Goodchild, David J. Maguire (2005) Geographic Information Systems and Science, 2nd Edition, John Wiley & Sons.
22. Star, Jeffrey and John Estes (1996), Geographical Information Systems: An Introduction, Prentice-Hall, Inc., N.J.
23. Slocum et. Al. (2009), Thematic Cartography and Geovisualization
24. Sabins (Jr.) F. F. (1986), 'Remote Sensing - Principles and Interpretation', W. H. Freeman & Co., New York.
25. Sahu, K. C. (2008): Text Book of Remote Sensing and Geographical Information System, Atlantic Publishers and Distributors (P) Ltd., New Delhi.
26. Thomas Lillesand, Ralph W. Kiefer, Jonathan Chipman (1015) Remote Sensing and Image Interpretation, 7th Edition
27. W. G. Rees (2012) Physical principles of remote sensing, Cambridge University Press.

Specialisation I : Physical Geography and Earth Systems

Title of the Course – Watershed Conservation and Management								
Year – 1				Semester - I				
Course Type	Course code	Credit Distribution		Credits	Allotted Hours	Allotted Marks		
DSE – 1	GEOG 50601	Theory	Practical	04	60	CIE	ESE	Total
		04	00			50	50	100

Course Objectives:

1. To understand the basic concept of watershed and its characteristics.
2. To conceptualize basic watershed management and development process
3. To understand the importance of soil and erosion
4. To understand the importance of soil conservation
5. To know the basics of water harvesting and its types
6. To understand the water harvesting situation with respect to Indian sub-continent
7. To understand the watershed management process in India and its technicalities
8. To more about the evaluation of the watershed management

Course Outcomes:

After completion of this course students will:

- CO 1. Clear understanding of the basic concepts of watershed and its characteristics.
 CO 2. Understanding the watershed management and development process
 CO 3. Complete knowledge about the importance of soil and erosion
 CO 4. Understand the importance of soil conservation
 CO 5. Understand the process of water harvesting and its types
 CO 6. Clear idea of the water harvesting situation with respect to Indian sub-continent
 CO 7. Understand the watershed management process in India and its technicalities
 CO 8. Understanding the evaluation of the watershed management

Unit 1: Watershed concepts

(15 Hours)

- 1.1 Watershed – Need for an integrated approach
- 1.2 Influencing factors – Geology and Soil, Morphological characteristics – Toposheet – Delineation – Codification,
- 1.3 Watershed development problems and prospects.
- 1.4 Watershed management - concept, objectives and factors affecting

Unit 2: Soil conservation measures

(15 Hours)

- 2.1 Soil conservation methods- types of erosion – water and wind erosion: causes, factors, effects and control
- 2.2 Causes and impacts of soil erosion
- 2.3 Soil conservation measures – agronomical and mechanical
- 2.4 Estimation of soil loss

Unit 3: Water harvesting and conservation

(15 Hours)

- 3.1 Water harvesting needs and types
- 3.2 Water harvesting techniques – runoff harvesting – short-term and long-term techniques

3.3 Harvesting structures- ancient water harvesting structure in India, aspects of water harvesting structure

3.4 Non-structural measures for water harvesting

Unit 4: Watershed management

(15 Hours)

4.1 Watershed development in India, common guidelines, allocation of funds

4.2 Project proposal formulation – watershed development plan – entry point activities – estimation

4.3 Watershed economics – grassland management, wasteland management – agro-forestry

4.4 Evaluation of watershed management

Suggested reading materials:

1. Authority, N. R. A. (2008). Common Guidelines for Watershed Development Projects, Government of India.
2. Dhruva Narayana, G. Sastry, V. S. Patnaik,(1997) “Watershed Management”, CSWCTRI, Dehradun, ICAR Publications.
3. Ghanashyam Das, (2000) Hydrology and Soil Conservation engineering, Prentice Hall of India Private Limited, New Delhi.
4. Glenn O. Schwab, (1981) Soil and Water Conservation Engineering, John Wiley and Sons.
5. Gurmail Singh, (1982) A Manual on Soil and Water Conservation, ICAR Publication, New Delhi.
6. Heathcote, I. W. (1988) Integrated Watershed Management: Principles and Practice. John Wiley and Sons, Inc., New York.
7. Lal, Ruttan. (2000). Integrated Watershed Management in the Global Ecosystem. CRC Press, New York.
8. Raghunath. H.N (2004). Hydrology, New Age International Publishers.
9. Singh. R. (2000). Watershed Planning and Management, Yash Publishing house, Bikaner.
10. Suresh, R. (1982) Soil and Water Conservation Engineering, Standard Publication, New Delhi.
11. Tideman, E.M (1996). Watershed management: Guidelines for Indian conditions, Omega scientific Publishers, New Delhi.
12. Vir Singh, Raj , (2000) Watershed Planning and Management, Yash Publishing House, Bikaner.
13. Brooks, K. N., P. F. Ffolliott, H. M. Gregersen and L. F. DeBano. (1997). Hydrology and the Management of Watersheds. Second Edition. Iowa State University Press. Ames, Iowa. 502 pp.

Title of the Course – Coastal Geomorphology								
Year – 1				Semester - I				
Course Type	Course code	Credit Distribution		Credits	Allotted Hours	Allotted Marks		
DSE – 1	GEOG 50602	Theory	Practical	04	60	CIE	ESE	Total
		04	00			50	50	100

Course Objectives:

1. To develop the understanding of the coastal processes and coastal environments
2. To create the awareness about coastal systems and their dynamics
3. To enhance the knowledge about the climate change with special reference to coastal hazards and importance of coastal zone management.

Course Outcomes:

The students will be able to:

CO 1. Identify the coastal components and understand the interactions between the coastal zone, foreshore and backshore zones.

CO 2. Inculcate a balanced view about the coastal development

CO 3. Know the impact of climate change on coastal areas and design coastal zone management plans.

Unit 1 : Morphodynamics of coastal systems (15 Hours)

- 1.1 Definition of coastal zone, coast line and related nomenclature
- 1.2 Models in coastal geomorphology, feedback, thresholds and equilibrium
- 1.3 Coastal classification schemes of Johnson, Shephard; Hayes (1979), and Darlymple, Zaitlin and Boyd (1992).
- 1.4 Paleoenvironmental analysis and dating coastal landforms

Unit 2 : Coastal processes (15 Hours)

- 2.1 Ocean waves: Types, characteristics, propagation, refraction, and reflection; wave spectrum, wave-induced near-shore currents
- 2.2 Tides: Types and tide generating forces; tidal theories, tidal characteristics in open coasts, bays and estuaries.
- 2.3 Sea level variations: Causes and consequences; Pre-Quaternary and Quaternary, isostatic adjustments and present sea level trends.
- 2.4 Sediments in coastal and near-coastal area – types of sediments, sediment movements - spatial distribution and temporal changes in sediments, monitoring changes in coastal areas and sediment movements with techniques such as GNSS surveys and LiDAR.

Unit 3 : Coastal morphology (15 Hours)

- 3.1 Morphology of rocky coasts: Morphodynamic evolution of cliff and platform, polygenetic rocky coasts and the role of inheritance.
- 3.2 Morphology of sandy coasts: Changes in beach planform and profile, dune building phases, beach-dune interaction.
- 3.3 Morphology of muddy coasts: Morphodynamic evolution of tidal flats and salt marshes, tidal inlets and their role in sedimentation.

- 3.4 Morphology of deltaic and estuarine coasts: Morphodynamic evolution of deltas and estuaries, delta-front processes and estuarine hydrodynamics and their role in deltaic-estuarine sedimentation.

Unit 4 : Coastal Hazards and Management

(15 Hours)

- 4.1 Coastal Hazards: - Coastal erosion prevention structures - Classification and impacts, coastal pollution, salt water intrusion - sources and management, sea level change, forecasting coastal hazards, anthropogenic activities and coastal areas – coastal projects and encroachments
- 4.2 Climate change and its impact on coastal ecosystems, coastal morphology and sea level
- 4.3 Coastal vulnerability assessment – vulnerability of coast, beaches and dunes, identification of beach stages, coastal floods and modelling, shoreline change detection – DSAS technique.
- 4.4 Integrated coastal management plan: Implementation, monitoring and evaluation; Coastal Regulation Zones; Coastal reclamation and effects with special reference to Mumbai.

Suggested Reading Materials:

1. Ahmed, E. (1972). *Coastal geomorphology of India, orient*. Longmans.
2. Bird, E. C. F. (1984). *Coasts – An introduction to coastal geomorphology*. Australian National University Press.
3. Bird, E. C. (2000). *Coastal geomorphology: An introduction*. John Wiley & Sons.
4. Bird, E. C. (2002). *Geomorphology: A systematic analysis of Late Cenozoic landforms, Prentice-Hall of India, New Delhi*.
5. Bloom, A. L. (2002). *Geomorphology* (3rd ed) Prentice-Hall of India. New Delhi.
6. Davis, J. L. (1980). *Geographical variation in coastal development*. Longman.
7. Embelton, & Thornes. (1979). *Process in geomorphology*. Arnold.
8. Fairbridge, R. (1968). *Encyclopaedia of geomorphology*.
9. Goudie, A. S. (2004) (Eds.). *Encyclopaedia of geomorphology*. Routledge.
10. Hails, J., & Carr, A. (1975). *Nearshore sediment dynamics and sedimentation*. Wiley.
11. Johnson, D. W. (1965). *Shore processes and shoreline development, Hanfer, New York*.
12. Kale, V. S., & Gupta, A. (2001). *Introduction to geomorphology*. Orient Longman.
13. Karlekar, S. N. (2016). *Coastal geomorphology of India*. Aparna Publication.
14. Karlekar, S. N. (2009). *Coastal processes and landforms*. Aparna Publication.
15. Karlekar, S. N. (1993). *Coastal geomorphology of Konkan*. Aparna Publication.
16. King, C. A. M. (1972). *Beaches and coasts*. Edward Arnold.
17. Masselink, G., & Hughes, M. G. (2003). *Introduction to coastal processes and geomorphology, Arnold, London*.
18. John, P. (1984). *An introduction to coastal geomorphology*. Arnold Heinemann.
- Tooley, M. J., & Shennan, I. (1987). *Sea level changes*. Basil Blackwell.

Title of the Course – Climate Change and Disaster Management								
Year – 1			Semester - I					
Course Type	Course code	Credit Distribution		Credits	Allotted Hours	Allotted Marks		
DSE – 1	GEOG 50603	Theory	Practical	04	60	CIE	ESE	Total
		04	00			50	50	100

Course Objectives:

1. To enhance the fundamental understanding of students about the scientific basis of climate change and natural disasters and disaster management.
2. To impart the knowledge about physical science of climate system and drivers of change as well as the hazard and vulnerability assessment techniques for various natural disasters.
3. To make the learners understand the climate change as per the IPCC reports and intricacies of disaster management

Course Outcomes: After completion of this course students will:

- CO 1. be able to explain how the climate system works and how the natural disasters occur.
 CO 2. understand the physical basis of climate change and natural disasters.
 CO 3. get familiarize with and understand the IPCC reports.
 CO 4. know the various aspects of vulnerability disaster management

Unit 1: The context of Climate Change (15 Hours)

- 1.1 Introduction to climate system – mechanisms of feedback and self-regulations - climate variability – major elements structuring the global climates – heat exchange – role of cryosphere, oceans – Global Conveyor Belt – ocean currents
- 1.2 Evidences and Indicators of Climate Change – records of past climatic changes and geological time scale
- 1.3 Impact of climate change and natural imbalance – Global thermal distribution, Ocean and ocean currents, seasons and transitions
- 1.4 Climate Change and biosphere

Unit 2: Analysis of IPCC Reports (15 Hours)

- 2.1 Climate Change Assessment and Data Collection – Global Efforts – UNFCCC, IPCC
- 2.2 Assessment Report I and II,
- 2.3 Assessment Report III and IV
- 2.4 Assessment Report V and Assessment Report VI – In detail analysis

Unit: 3: Natural Hazards and hazard assessment (15 Hours)

- 3.1 Definition and types of disaster, Hazards and Disasters, Risk and Vulnerability in Disasters,
- 3.2 Natural disasters: earthquakes, floods, drought, landside, land subsidence, cyclones, volcanoes, tsunami, avalanches, global climate extremes
- 3.3 Classification of hazards, Hazard-specific Assessment methods
- 3.4 Social Economics and Environmental impact of disasters

Unit 4 : Disaster Management (15 Hours)

- 4.1 Principles of disasters management – hazard assessment, vulnerability assessment, rescue and relief
- 4.2 Hazard-specific risk and vulnerability assessment methods
- 4.3 Mitigation and Management techniques of Disaster, disaster preparedness
- 4.4 Disaster Management cycle, Disaster management policy, National and State Bodies for Disaster Management, Early Warning Systems

Suggested Reading Materials:

1. Berman, J. W., Wartman, J., Olsen, M., Irish, J. L., Miles, S. B., Tanner, T., Gurley, K., Lowes, L., Bostrom, A., Dafni, J., Grilliot, M., Lyda, A., & Peltier, J. (2020). Natural hazards reconnaissance with the NHERI RAPID facility. *Frontiers in Built Environment*, 6(v), 573067.org (Crossref).
<https://doi.org/10.3389/fbuil.2020.573067>
2. David Archer & Stefan Rahmstorf (2010): *The Climate Crisis, An Introductory Guide to Climate Change*, Cambridge University Press
3. David, J., (2011) “Climate change and Climate modelling”, Cambridge University Press.
4. Davies, T. (2015). *Landslide hazards, risks, and disasters* T. R. H. Davies (Ed.). Elsevier.
5. Dhameja, A., & Dhameja, P. (2001). *Disaster mitigation: Experiences and reflections*. Prentice Hall.
6. Elliott, J. R. (2020). Earth observation for the assessment of earthquake hazard, risk and disaster management. *Surveys in Geophysics*, 41(6, November), 1323–1354.org (Crossref).
<https://doi.org/10.1007/s10712-020-09606-4>.
7. GCRP, U S. (2009) "Climate literacy: the essential principles of climate science."
8. Hyndman, D. W., & Hyndman, D. W. (2017). *Natural hazards and disasters* (5th ed). Cengage Learning.
9. Khanna B K Nina Khanna. (2011). *Disasters: Strengthening community mitigation and preparedness* New India Publishing Agency.
10. Maque M, A (2021) *Understanding Climate change*, National Book Trust India.
11. Ramesh M (2019) *The climate Solution*, Hachette India.
12. Schumann, G., Hostache, R., Puech, C., Hoffmann, L., Matgen, P., Pappenberger, F., & Pfister, L. (2007). High-resolution 3-D flood information from radar imagery for flood hazard management. *IEEE Transactions on Geoscience and Remote Sensing*, 45(6, June), 1715–1725.org (Crossref). <https://doi.org/10.1109/TGRS.2006.888103>.
13. Singh, R. B. (2006). *Natural hazards and disaster management: Vulnerability and mitigation*. Rawat Publications

Specialisation II :Urban and Regional Planning and Development

Title of the Course – Urban Spaces: Historical, Sociological and Economic Perspectives								
Year – 1				Semester - I				
Course Type	Course code	Credit Distribution		Credits	Allotted Hours	Allotted Marks		
DSE – 1	GEOG 50604	Theory	Practical	04	60	CIE	ESE	Total
		04	00			50	50	100

Course Objectives:

1. To make students understand various stakeholders and makers of the cities and urban spaces.
2. To make the students learn about various forces and processes that are shaping the urban spaces.

Course Outcome:

- CO 1. Students would learn how the cities are shaped by various processes and forces.
 CO 2. How the balance between all the elements is necessary to promote an inclusive city would be learnt by the students.

Unit 1 : The origin and growth of cities (15 Hours)

- 1.1 Preconditions for Urban Growth – pre-industrial city -industrial revolution and its effects on European urbanism- theories of urban origins
- 1.2 Early Urban hearths-the spread of urbanism and emergence of town planning- urban revival in western Europe- emergence of medieval towns and early modern urbanism- new urbanisation
- 1.3 Industrial cities and their forms -zoning and building regulations-residential segregation-residential sorting by class-socio-spatial segregation- development of slums-housing for the urban poor
- 1.4 Post-industrial urbanism- quartering of urban space- post-industrial /postmodern cities and their changing form.

Unit 2 : Urban Design (15 Hours)

- 1.1 Urban Structure – interrelationship between various landuses – urban grain - Density mix - the intensity of development and the diversity of users of urban space - Height and massing – its association with surrounding landforms – façade and interfaces
- 1.2 Public spaces – streets, open spaces, parks, pavements, etc. - Public space –types and uses
- 1.3 Topography – landscape and environment and its impact on urban design
- 1.4 Physical entity– built forms, architectural forms – the concept of built environment – production and reproduction of built environment

Unit 3 : Landscape production and Patterns of consumption (15 Hours)

- 3.1 Socio-spatial dialectics- different patterns of consumption by different social groups-as symbolic expressions of the values, social behavior, and individual actions of people -its link in economic patterns, social behavior- technological innovations
- 3.2 Regeneration and suburbanization - market segmentation and polarization of the retailing landscape – residential segregation-ghetto, slum, gated community- ethnic segregation and ethnic areas in the city.
- 3.3 Landscape zoning – landscape planning – natural process plans –social process plans – visual plans – landform plans – water space plans - Habitat plans – Air plans

3.4 Landscape evaluation techniques – critical appraisal of historic examples of landscape plans – landscape conservation – principles and techniques

Unit 4 : Political –Economy perspective

(15 Hours)

- 4.1 Interpretation of change in urban land use – underlying structural forces
- 4.2 City in advanced capitalist society – laws of capital accumulation – Harvey’s model of the “circulation of the capital”
- 4.3 Over-accumulation crisis and post-war suburbanization- actors in the production of built environment- growth coalitions
- 4.4 Major actors in production of the built environment – speculators – real estate agents, financing institutions, etc.

Suggested Reading Materials:

- 1. Carter, H (1972): The Study of Urban Geography, Edward Arnold.
- 2. A. Latham, D. McCormack, K. McNamara, D. McNeill (2009): Key Concepts in Geography, Sage.
- 3. Campbell, H. 2006. “Just Planning: The Art of Situated Ethical Judgment.” *Journal of Planning Education and Research* 26(1): 92–106.
- 4. Campbell, H. 2012a. “‘Planning Ethics’ and Rediscovering *the Idea of Planning*.” *Planning Theory* 11 (4): 379–99.
- 5. Campbell, H. 2012b. “Planning to Change the World: Between Knowledge and Action Lies Synthesis.” *Journal of Planning Education and Research* 32 (2): 135–46.
- 6. Pacione, M. 2005, Urban Geography, Routledge, New York
- 7. Communities and Local Government. 2006. *Barker Review of LandUse Planning: Final Report—Recommendations*. London: Stationery Office.
- 8. Innes, J. 1995. “Planning Theory’s Emerging Paradigm: Communicative Action and Interactive Practice.” *Journal of Planning Education and Research* 14 (3): 183–91.

Specialisation III Climate Change and Sustainability Studies

Title of the Course – Climate Change Science								
Year – 1			Semester - I					
Course Type	Course code	Credit Distribution		Credits	Allotted Hours	Allotted Marks		
DSE – 1	GEOG 50605	Theory	Practical	04	60	CIE	ESE	Total
		04	00			50	50	100

Course Objectives:

1. The part of this course is designed for students to give fundamental understanding of the scientific basis of climate change.
2. The part of the course introduce to the physical science of our climate system, and drivers of change.
3. For in-depth understanding of the climate change the IPCC reports has been introduced.

Course Outcomes (Cos): After completion of this course students will:

- CO 1. Student will able to explain how the climate system works.
 CO 2. Understand the physical basis of climate change
 CO 3. Students will familiarize and understand the IPCC reports.

Unit 1: The context of Climate Change (15 Hours)

- 1.1 Introduction to climate system – mechanisms of feedback and self-regulations - climate variability – major elements structuring the global climates – heat exchange – role of cryosphere, oceans – Global Conveyor Belt – ocean currents
- 1.2 Evidences and Indicators of Climate Change – records of past climatic changes and geological time scale
- 1.3 Impact of climate change and natural imbalance – Global thermal distribution, Ocean and ocean currents, seasons and transitions
- 1.4 Climate Change and biosphere

Unit 2: Theoretical Perspectives on Climate Change (15 Hours)

- 2.1 Milankovitch Theory - Greenhouse theory of Climate Change
- 2.2 Political theory and Climate change – Conceptual analysis, critical theory, critical legal studies, Neo-Marxism
- 2.3 Socialism, Marxism, Capitalism - perceptions on climate Change
- 2.4 Perspectives of Alvin Toffler, John Belamy Foster, Yuval Noah Harari

Unit 3 : Climate Change and India (15 Hours)

- 3.1 Impact of Climate change in India on various sectors like agriculture and other primary activities
- 3.2 Climate change – spaces, people and communities – issues of climate change induced displacement – climate refugees
- 3.3 Various frameworks to address climate change in India
- 3.4 Assessment of Indian policies of Climate change mitigation, adaptation and resilience building

Unit 4 : Analysis of IPCC Reports (15 Hours)

- 4.1 Climate Change Assessment and Data Collection – Global Efforts – UNFCCC, IPCC4

- 4.2 Assessment Report I and II,
- 4.3 Assessment Report III and IV
- 4.4 Assessment Report V and Assessment Report VI – In detail analysis

Suggested Reading Materials:

1. David, J., (2011) “Climate change and Climate modelling”, Cambridge University Press.
2. David Archer & Stefan Rahmstorf (2010): The Climate Crisis, An Introductory Guide to Climate Change, Cambridge University Press
3. GCRP, U S. (2009) "Climate literacy: the essential principles of climate science.".
4. Maque M, A (2021) Understanding Climate change, National Book Trust India.
5. Ramesh M (2019) The climate Solution, Hachette India.
6. Toffler, Alvin. (1970). Future shock. New York :Random House,
7. Harari, Y. N. (2015). *Sapiens*. Harper.
8. Foster, J. (1999) : The Vulnerable Planet : A Short Economic History of the Environment. Monthly Review Press, NYU
9. IPCC (1990). First Assessment Report. <https://www.ipcc.ch/>
<https://www.ipcc.ch/report/ar1/syr/>
10. IPCC (1995). Second Assessment Report. <https://www.ipcc.ch/>
<https://www.ipcc.ch/report/ar1/syr/>
11. IPCC (2001). Third Assessment Report. <https://www.ipcc.ch/>
<https://www.ipcc.ch/report/ar3/syr/>
12. IPCC (1990). Fourth Assessment Report. <https://www.ipcc.ch/>
<https://www.ipcc.ch/report/ar4/syr/>
13. IPCC (1990). Fifth Assessment Report. <https://www.ipcc.ch/>
<https://www.ipcc.ch/report/ar5/syr/>
14. IPCC (1990). Sixth Assessment Report. <https://www.ipcc.ch/>
<https://www.ipcc.ch/report/ar6/syr/>

Specialisation IV : Human Geography and Human Ecology

Title of the Course – Introduction to Geopolitics								
Year – 1			Semester - I					
Course Type	Course code	Credit Distribution		Credits	Allotted Hours	Allotted Marks		
DSE – 1	GEOG 50606	Theory	Practical	04	60	CIE	ESE	Total
		04	00			50	50	100

Course Objectives:

1. The course intends to make students aware about the concept and implication of world political structure.
2. The course offers a detailed account of fundamentals of geopolitics and its implications on various nation states.

Course Outcome:

- CO 1. Students are expected to emerge with a holistic understanding on how the world political structure has been shaped by various forces and processes leading to a vary complex structure of international relations.
- CO 2. The understanding would formulate a base for understanding the geostrategies and international relation policies.

Unit 1 : Introduction to Political Geography (15 Hours)

- 1.1 Relevance of Space in political Geography Concept of Territoriality claims over land, water and air as territories - contestations
- 1.2 Sovereignty - State as geographical and political unit theories of state formation - Concept of nation-states - Territorial state and international Relations
- 1.3 Region as a base of international politics characterisation of regionalism Trends in Post World War II Period
- 1.4 Geography of Power and Conflict traditional praxis of power - nation-states, non-nation-state praxis - role of multinational Corporations and other non-state agencies in international policy making

Unit 2 : Theories of Geopolitics application and critique (15 Hours)

- 2.1 Concept of Geopolitics – Fundamentals of Geopolitics
- 2.2 Modern – postmodern and critical Geopolitics
- 2.3 Heartland Theory (Halford J. Mackinder), Sea Power (Alfred Thayer Mahan), Rimland Theory (Nicholas J. Spykman), Theory of Air Power Supremacy (Alexander Seversky),
- 2.4 German Geopolitik , Functional Approach to Political Geography (Richard Hartshorne), Stephen B. Jones (Unified Field Theory)

Unit 3 : Geopolitics and Spatial Approach (15 Hours)

- 3.1 Geopolitics of war - World tension zones
- 3.2 Geography of international terrorism - Contemporary examples.
- 3.3 Politics of the environment global environmental issues Claims and counterclaims Global North and Global South - water as a disputed territory
- 3.4 Politics of Climate Change

Unit 4 : Contemporary World Political Structure and Ethnic Identities

(15 Hours)

- 4.1 Ethnicity – A major context to geopolitics
- 4.2 Identity politics in West Asia, Africa and South-east Asia
- 4.3 Clash of Civilisation - Samuel Huntington
- 4.4 Cultural hybridisation - religion, ethnicity and identity politics the future

Suggested Reading Materials:

1. Taylor, P.J., (1985): Political Geography; World Economy, Nation-State and Locality, Longman.
2. Kasperson. R E. and Minghi, J.V. (1969):The Structure of Political Geography, University of London Press.
3. De Blij. H.J. (1967): Systematic Political Geography, John Wiley and Sons.
4. Jackson, W. A. D. (1964): Politics and Geographic Relationships, Prentice Hall.
5. Nijman Airman, J. (1993): The Geopolitics of Power and Conflict, Belhaven Press.
6. Dikshit, S.K. (1994); Geography of Elections, Rawat Publishers.
7. Amin, S. (1980): Class and Nation, Monthly Review Press. 32
8. Agnew, J. and Corbridqe, S. (1995): Mastering Space, Routledge.
9. Thorns, D. C. (1992): Fragmenting Societies, Routledge.
10. Bhambhri, C. P. (1991): Elections 1991; An Analysis, B. R. Publishers.
11. Prescott, J R V. (1967): Geography of Frontiers and Boundaries, Hutchinson & Co.
12. Johnston, R J. (1982): Geography and the State, MacMillan
13. Norris, R. E. and Haring, L.L. (1980); Political Geography, Bell and Howell.
14. Painter Joe and Alex Jeffrey (2009) Political Geography an Introduction to Space and Power, Sage, London.
15. Agnew John, (2002) Making Political Geography, Arnold, London.

Title of the Course – Tourism Development and Planning - I								
Year – 1				Semester - I				
Course Type	Course code	Credit Distribution		Credits	Allotted Hours	Allotted Marks		
		Theory	Practical			CIE	ESE	Total
DSE – 1	GEOG 50607	04	00	04	60	50	50	100

Course Objectives: To gain knowledge about -Tourism Concepts, Approaches, Methodologies of Study, planning & management.

Course Outcomes:

CO 1. Students will be able to develop an understanding about tourism as a phenomenon, the elements of tourism and their interrelationships.

CO 2. They will learn about the various approaches applied to study tourism from different perspectives.

CO 3. They will gain knowledge about the application of latest tools and techniques for tourism planning and management.

Unit 1 : Introduction

(15 Hours)

- 1.1 Conceptualizing tourism – meaning & components of tourism,
- 1.2 tourism types and forms;
- 1.3 tourists – types, purpose of visit & motivation, pattern of flow & seasonality;
- 1.4 factors influencing tourism; tourism carrying capacity

Unit 2 : Stakeholders in Tourism

(15 Hours)

- 2.1 Definition and meaning; stakeholder theory;
- 2.2 types of stakeholders; their role, participation, involvement & interest;
- 2.3 tourism organizations and operators

Unit 3 : Approaches to understanding tourism

(15 Hours)

- 3.1 Philosophical and theoretical approaches-
- 3.2 Economic approach, social and cultural approach,
- 3.3 Environmental approach,
- 3.4 Spatial approach

Unit 4 : Tourism technologies

(15 Hours)

- 4.1 Identification, assessment, and planning of destinations
- 4.2 key role of GIS, AI and Big Data in resource identification, planning, operation, and impact assessments

Suggested Reading Materials:

- 1. Abreu, A. Liberato, D. Gonzalez, E.A.& Ojeda, J.C.G. (eds) (2020). *Advances in Tourism, Technology and Systems: Selected Papers from ICOTTS20*, Volume 2. Springer.
- 2. Boniface, B.G. and Cooper, C.P. (1987) *The Geography of Travel and Tourism*. Butterworth-Heinemann

3. Freeman, R.E., Harrison, J.S. Wicks, A.C., Parmer, B.L. and De Colle, S. (2010). *Stakeholder Theory: The State of the Art*. Cambridge University Press.
 4. Goeldner, R. and Ritchie, B. (2005). *Tourism: Principles, Practices Philosophies* (9th Edition). John Wiley & Sons.
 5. Hall, C.M. and Page, S.J.(2005) *Geography of Tourism and Recreation: Environment, Place and Space*, London: Routledge.
 6. Holden, A. & Fennell. (2013). *The Routledge Handbook of Tourism and the Environment*. Routledge.
 7. Kaurav, R.P. S, Gursoy,D & Chowdhary, N. (2020) *An SPSS Guide for Tourism, Hospitality and Events Researchers*. Routledge.
 8. Lok, J. (2022) *How Robots Can Bring Positive Emotion to Travellers*, Notion Press
 9. Pearce, D.G. (1987) *Tourism Today: A Geographical Analysis*, Harlow: Longman.
 10. Pearce, D.G. (1989) *Tourism Development*, Harlow: Longman.
 11. Pearce, D.G. and Butler, R.W (eds) (1993). *Tourism Research: Critiques and Challenges*. Routledge.
 12. Shaw, G. and Williams, A.M. (1994). *Critical Issues in Tourism: A Geographical Perspective*. Blackwell (second Edition).
 13. Shaw, G. and Williams, A.M. (2004). *Tourism and Tourism Spaces*. Sage.
 14. Urry, J. (1990) *The Tourist Gaze: Leisure and Travel on Contemporary Societies*. Sage.
 15. United Nations World Tourism Organization (2008). *Glossary of Tourism Terms*. In UN standards for measuring tourism. available at <https://www.unwto.org/glossary-tourism-terms>
 16. Williams, S. (1998) *Tourism Geography*. Routledge.
- Articles:*
17. Amoako, G.K., Darko, T.O. and Marfo, S.O. (2022). Stakeholders role in tourism sustainability: the case of Kwame Nkrumah Mausoleum and centre for art and culture in Ghana. *International Hospitality Review*. 36 (1): 25-44.
<https://www.emerald.com/insight/content/doi/10.1108/IHR-09-2020-0057/full/pdf?title=stakeholder-role-in-tourism-sustainability-the-case-of-kwame-nkrumah-mausoleum-and-centre-for-art-and-culture-in-ghana>
 18. Butler, R.W. (1999). Sustainable tourism: a state-of-the-art review. *Tourism Geographies*, 1(1):. 7-25.
 19. Bulchand-Gidumal, J. (2022). Impact of Artificial Intelligence in Travel, Tourism, and Hospitality. In: Xiang, Z., Fuchs, M., Gretzel, U., Höpken, W. (eds) *Handbook of e-Tourism*. Springer, Cham.
https://doi.org/10.1007/978-3-030-48652-5_110

Title of the Course – Population and Migration Studies - I								
Year – 1			Semester - I					
Course Type	Course code	Credit Distribution		Credits	Allotted Hours	Allotted Marks		
DSE – 1	GEOG 50608	Theory	Practical	04	60	CIE	ESE	Total
		04	00			50	50	100

Course Objectives:

1. To understand intricacies and theoretical frameworks related to Population Geography and Demography
2. To study the demographic processes related to fertility, mortality and migration.
3. To examine concepts and measures related to fertility , mortality and migration.

Course Outcomes:

- CO 1. Students are expected to develop an overview on different elements of Population Geography .
CO 2. Students need to apply understanding of concepts for population problems.

Unit 1 : Concepts and Methods in Population Geography (15 hours)

- 1.1 Concepts- Population Geography and Demography, Demographic Perspectives
- 1.2 Demographic methods-Demographic Analysis, Estimation and projection , Standardization , Cohort Analysis, Spatial Analysis and Epidemiologic Analysis
- 1.3 Demographic Data- Source, Types and Collection Methods

Unit 2 : Population Size,Distribution, Concentration and Composition (15 hours)

- 2.1 Defining Size, Distribution and Concentration
- 2.2 Population Composition Variables- Biosocial and Sociocultural Characteristics
- 2.3 Displaying and Analyzing Compositional Variables- Descriptive Statistics, Population Pyramids, Dependency Ratio and Cohort Analysis

Unit 3 : Demographic Processes : Fertility and Mortality (15 hours)

- 3.1 Concepts and measures of Fertility and Mortality
- 3.2 Trends in Fertility and Mortality with special reference to India
- 3.3 Factors affecting Fertility and Mortality with special reference to India
- 3.4 Data Source for Fertility and Mortality

Unit 4 : Demographic Processes: Migration (15 hours)

- 4.1. Concepts and Measures of Migration
- 4.2 Types and Patterns of Migration - International and Internal Migration
- 4.3 Impact of Migration- Social, Political, Cultural and Economic
- 4.4 Laws and Theories of Migration- Ravenstein Laws of Migration, Inverse Distance Laws, Theory of Intervening Opportunities and Gravity Model

References:

- 1.Thomas, R. K. (2018) Concepts, Methods and Practical Applications in Applied Demography. Springer.
- 2.Newbold, B. (2017) Population Geography: Tools and Issues. Rowman & Littlefield Publishers.

3. Bhende, A and Kanitkar, T. (1985): Principles of Population Studies, Himalayan Publishing House, Mumbai.
4. Clarke, J. L. (1992): Population Geography, Pergamon Press, Oxford.
5. Demko, G. J., Rose, H. M. and Schnell, G. A. (1979): Population Geography: A Reader, Mc Graw Hill, New York.
6. Zelinsky, W., Kosinski, LA, Prothero, R.M. (eds.)(1970) Geography and a Crowding World, Oxford University Press, London.
7. Ackermann, E.A. (1959): Population and Natural Resources in Hauser, P.M. and Duncan, O.D,(eds.) The Study of Population, Chicago.
8. Clarke, J.I. (1971): Population Geography and the Developing Countries .
9. Harper, C.L. (2001): Environment and Society, Human Perspectives on Environmental Issues, Prentice Hall, New Jersey.
10. Ehrlich. P.R., and Ehrlich, A.M.(1992): Population Explosion, Doomsday, New York.
11. Saare, P. and Blunder, J. (eds.) (1995): An Overcrowded World? Population, Resources and Environment, The Open University, Oxford.
12. Johnston, R.J. and Taylor, P. (eds.): The World in Crisis, Oxford: Blackwell.
13. Potter, R.B., Binns, T., Elliott, J.A. and Smith, D. (1999): Geography of Development, Longman.
14. Srinivas, K. and Vlanol, M, (2001): Population, Development Nexus in India: Challenges for the New Millenium, Tata McGraw Hill, New Delhi.

Title of the Course – Socio-Cultural Geographies - I								
Year – 1			Semester - I					
Course Type	Course code	Credit Distribution		Credits	Allotted Hours	Allotted Marks		
DSE – 1	GEOG 50609	Theory	Practical	04	60	CIE	ESE	Total
		04	00			50	50	100

Course Objective:

1. To provide a broad overview of the key concepts and approaches in social geography
2. To understand the relation between social processes, social identity and geographical space.

Course Outcome:

CO 1. The students will get an understanding of the major concepts and approaches in the field of social geography.

CO 2. The course will enable them to develop understanding of the social structure, process and spatial formations/production of social space.

Unit 1: Introduction to Social Geography

(15 Hours)

- 1.1 Key concepts in social geography
- 1.2 Gemeinschaft-Gesellschaft, Social Darwinism,
- 1.3 Historical-materialism, Anomie, Conflict theory, Feminism & Patriarchy,
- 1.4 Urbanism, Globalization, Post-Fordism, Post-modernisation

Unit 2 : Evolution of Social Geography

(15 Hours)

- 1.1 Evolution of perspectives in social geography
- 1.2 Material social geographies from 1800s to 1970s and beyond;
- 1.3 Immaterial social geographies in 1970s, 1980s and beyond
- 1.4 Radical social geographies, humanistic social geographies; Cultural turn in social geography

Unit 3 : Society and Space

(15 Hours)

- 3.1 Social relations and spatial structures
- 3.2 spatial diversity and differentiation
- 3.3 social processes and spatial form
- 3.4 spatiality of society and economy

Unit 4 : Production of Social Space

(15 Hours)

- 4.1 Social groups, social identity and space
- 4.2 Social production of space – spatial triad
- 4.3 Socio-spatial dialectic
- 4.4 Spatial semiotics

Suggested Reading Materials:

1. Banerjee-Guha, S. (2004): *Space, Society and Geography*, Rawat, New Delhi.
2. Benko, G. and Strohmayer, U. (2004): *Human Geography: A History for the 21st Century*, Arnold, London.
3. Casino, V.J.D., Jr., (2009): *Social Geography: A Critical Introduction*, Wiley-Blackwell, Chichester
4. Cloke, P., Philo, C., and Sadler, D. (1991): *Approaching Human Geography: An Introduction to Contemporary Theoretical Debates*, Paul Chapman Publishing Ltd., London.
5. Coates, B.E., Johnston, R.J. and Knox, P.L. (1977): *Geography and Inequality*, Oxford University Press, Oxford and London
6. Eyles, J. (ed.) (1986): *Social Geography in International Perspective*, Rowman and Littlefield, New Jersey and Los Angeles
7. Gregory, D. and Larry, J. (eds.) (1985): *Social Relations and Spatial Structures*, MacMillan, London
8. Hammett, C. (eds.) (1996): *Social Geography: A Reader*, Arnold, London
9. Jackson, P. and Susan, J.S. (1984): *Exploring Social Geography*, George Allen and Unwin, Boston and Sydney.
10. Jones, E. (ed.) (1975): *Readings in Social Geography*, Oxford University Press, London
11. Lefebvre, H., Nicholson-Smith, D. (1991): *The Production of Space*, Blackwell.
12. Slattery, M. (2003): *Key Ideas in Sociology*, Nelson Thornes Ltd., Cheltham.
13. Smith, D. (1977): *Geography: A Welfare Approach*, Edward Arnold, London

Specialisation V : Geospatial Technology

Title of the Course – Earth Observation Science								
Year - 1				Semester - I				
Course Type	Course code	Credit Distribution		Credits	Allotted Hours	Allotted Marks		
DSE - 1	GEOG 50610	Theory	Practical	04	60	CIE	ESE	Total
		04	00			50	50	100

Course Objectives:

1. Main objective is to learn how to generate information about the Earth from remote sensing data.

Course Outcomes:

At the end of the course students must be able to:

CO 1. Explain the principles and use the vocabulary of Remote Sensing;

CO 2. Describe the physical background of remote sensing and compare the main platforms and sensor systems;

CO 3. Explain the main digital image processing procedures and Describe the common methods of image analysis; Perform basic image processing techniques;

CO 4. Carry out a visual interpretation of an aerial photograph or a satellite image;

CO 5. Apply appropriate Remote Sensing methods for problem solving;

CO 6. Understand the capabilities, uses and limitations of RS in their field of application;

CO 7. Design and carry out sequential data processing steps for solving a typical application problem;

Unit 1 : Electromagnetic Spectrum

(15 Hours)

1.1 Electromagnet energy and remote sensing:

Electromagnetic energy, Waves and photons, Sources of EM energy and radiometric units, Electromagnetic spectrum, Energy interaction in the atmosphere, Absorption and transmission, Atmospheric scattering, Energy interactions with the Earth's surface, Spectral reflectance curves, Sensing of EM energy, Sensing properties, Classification of sensors

1.2 Platforms and passive electro-optical sensors

Platforms and missions, Moving platforms, Aerial survey missions, Satellite missions, Market figures, Cameras, Detector arrays, Optical system, Scanners, Components, Geometric aspects, Stereoscopy, Overview of popular spaceborne sensors, Data selection criteria, Information requirements and constraints, Availability and cost

Unit 2 : Radiometric and Geometric Operations

(15 Hours)

2.1 Visualization and radiometric operations

Visualization, Perception of colour, Image display, Radiometric corrections, Sun elevation correction, Haze correction, Elementary image processing, Histograms, Histogram operations, Filter operations, Image fusion

2.2 Geometric operations

Elementary image distortions, Relief displacement, Two-dimensional approaches, Georeferencing, Geocoding, Three-dimensional approaches, Orientation, Monoplotting, Orthoimage production, Stereo restitution

Unit 3 : Image Interpretation and Analysis

(15 Hours)

3.1 Visual image interpretation

Interpretation fundamentals, Human vision, Interpretation elements, Mapping, Interpretation,

Analysing field data and map preparation, Quality aspects

3.2 Digital image classification

Principle of image classification, Image space, Feature space, Image classification, Image classification process, Preparation for image classification, Supervised image classification, Unsupervised image classification, Classification algorithms, Validation of the result, Pixel-based and object oriented classification

Unit 4 : Remote Sensing Data

(15 Hours)

4.1 Radar remote sensing:

Microwave remote sensing, Principles of imaging radar, Geometric properties, Geometric distortions, Radiometric distortions, Interpretation of radar images, SAR applications, INSAR

4.2 Laser Scanning:

Basic Principles, System Components, History & Variants, Applications

Suggested Reading Materials

1. American Society of Photogrammetry (1983): Manual of Remote Sensing, ASP Palis Church, V.A.
2. Barrett, E.G. and Curtis, L.F. (1992): Fundamentals of Remote Sensing in Air Photo-interpretation, McMillan, New York. 7.
3. Campbell. J. (1989): Introduction to Remote Sensing, Guilford, New York.
4. Curran, Paul, J, (1988): Principles of Remote Sensing, Longman, London.
5. Duda, R. O. and Hart, P. E. (1973): Pattern Classification and Scene Analysis Wiley, New York.
6. Gibson, P. J. (2000): 'Introduction to Remote Sensing - Digital Image Processing and Applications', Routledge - Taylor & Francis.
7. Gibson, P. J. (2000): 'Introduction to Remote Sensing - Principles and Concepts', Routledge - Taylor & Francis.
8. Iliffe, J.C (2006), Datums and Map Projections for Remote Sensing, GIS and Surveying, Whittles Publishing, New York.
9. Jonson. R. J. (2003): Remote Sensing of the Environment-An Earth Resources Perspective, Pearson Education Series in Geographical Information Science, Keith C. Clarke (Series editor) Pearson Educators Private Limited. (Singapore), New Delhi.
10. Joseph, G. (2009): Fundamentals of Remote Sensing, Universities Press (India) Pvt. Ltd., Hyderabad.
11. Klaus Tempfli, Norman Kerle, Gerrit C. Huurneman, Lucas L. F. Janssen (2009) Principles of Remote Sensing, An introductory textbook, ITC, University of Twente, Enschede, The Netherlands.
12. Russ, J. C. (1992): The Image Processing Handbook, CRC Press SIUE Library call #: TA1632.R88 (reference).
13. Sabins (Jr.) F. F. (1986), 'Remote Sensing - Principles and Interpretation', W. H. Freeman & Co., New York.
14. Sahu, K. C. (2008): Text Book of Remote Sensing and Geographical Information System, Atlantic Publishers and Distributors (P) Ltd., New Delhi.
15. Schowengerdt, R. A. (2006): 'Remote Sensing - Models and Methods for Image Processing', Elsevier India Pvt. Ltd., New Delhi.
16. Thomas Lillesand, Ralph W. Kiefer, Jonathan Chipman (1015) Remote Sensing and Image Interpretation, 7th Edition
17. W. G. Rees (2012) Physical principles of remote sensing, Cambridge University Press.

Title of the Course – Cartography – Visualisation and Dissemination of Geodata								
Year - 1				Semester - I				
Course Type	Course code	Credit Distribution		Credits	Allotted Hours	Allotted Marks		
DSE - 1	GEOG 50611	Theory	Practical	04	60	CIE	ESE	Total
		04	00			50	50	100

Course Objectives:

1. To introduce cartography as discipline in Geospatial Technology.

Course Outcomes:

- CO 1. What the roles are of geodata visualization in a GIS environment;
CO 2. How use and users tailor visualization design decisions;
CO 3. Various dissemination methods and environments, and their role in geodata provision for different kinds of use and users.
CO 4. The basic concepts related to 3D representation of geodata;
CO 5. Cartographic design principles to map topography and thematic data;
CO 6. The basic principles of animated maps.
CO 7. Main concepts of Geovisual exploration and analytics
CO 8. Cartographic visualization principles to different kinds of visualizations of geodata, and judge the appropriateness of their application, taking data characteristics and use issues into account.

Unit 1: Colour introduction maps: (15 Hours)

- 1.1 Colour Vision: Perception, Physical stimulus, Physiological reaction of the eye,
- 1.2 Colour output: Stimulation of the Cones and Rods, Primary colour transmitted light, Image display hardware, the monitor, Composites, Primary colour, reflected light,
- 1.3 Colour space: Munsell, Ostwald, The solid cube, conversion rgb/cmy, conversion cmy/rgb, HSL, RGB to HSL, HSV, RGB to HSV, Colour management, Colour charts, Colour factors that influence the choice, Colour tools
- 1.4 Definition of map, Why maps, Topographic and thematic maps; Maps- Chorochromatic maps, Dot maps, Proportional symbol maps, Proportional diagram maps, Pie graphs, Flowline maps, Isoline maps, Equal distance or equal travel time, Cartogram, Prism map, Choropleth maps, Methods in QGIS.

Unit 2 : Dissemination and Use Issues: (15 Hours)

- 2.1 Dissemination and Use Issues- digital format, by spoken or written language, by numbers, by RS imagery, video, 3D or virtual imagery, maps
- 2.2 Maps: Answers of map- elementary, intermediate, temporal, overall; Dissemination of maps- paper maps, map displays on monitor screens, roles and limitations of web maps
- 2.3 Framework data: Geodetic control data, Digital elevation model, Fundamental topography, Administrative boundaries, Geographical names

Unit 3 : Map Layout and Typography (15 Hours)

- 3.1 Map layout: goals, prerequisites, elements, marginal information, types of map layout, map layout balance, inset, legends, paper format
- 3.2 Typography- basics, historic overview, typographic terminology, graphic text variable, name placement

3.3 Visualization of 3d geospatial data: Definition and examples of three-dimensional map, relief, Terrain and other themes, Mapping non-terrain in 3d, 3D maps, Realistic, Abstract, Thematic, Prism maps, Virtual Reality as 3d mapping environment

Unit 4 : Geodata

(15 Hours)

4.1 Visual exploration of geodata - I:

History – information, insight, knowledge, reasoning; Geovisualization – location space, attribute space, time space; Visual analytics

4.2 Visual exploration of geodata - II:

Example of Minard's map content- location, branches, dates, survivors, temperature, location, battles

4.3 Graphic variables- Single static map, Multiple static maps; Dynamic visualization variables- Moment of display, Order, Duration, Frequency, Rate of change, Synchronization; Application of the variables

4.4 Map design:

Factors influencing map design; Data characteristics- Measurement levels- nominal, ordinal, interval, ratio; Bertin's visual (graphic) variables, cartographic grammar

Suggested Reading Materials:

1. Crone, G. R. (1968): Maps and their Makers: An Introduction to the History of Cartography, Hutchinson University Library, London.
2. Cuff, D. J. and M.T. Mattson (1982): Thematic Maps: Their design and Production, Methuen and Company, New York.
3. Dickinson, G.C. (1977): Statistical Mapping and Presentation of Statistics, Edward Arnold limited, London.
4. Dykes, MacEachren & Kraak (eds.) (2005), Exploring Geovisualization
5. Heywood, Ian etal (1998) An Introduction to Geographical Information Systems, Addison Wesley Longman, Limited, England.
6. Kraak, Menno-Jan and FerjanOrmeling (1996), Cartography Visualization of Spatial Data, Addison Wesley Longman Limited, England.
7. Keates. J S (1973): Cartographic Design and Production, 2nd edn., Longman Group Limited, London.
8. Keates, J.S. (1996): Understanding Maps, 2nd edn., Longman Group Limited, London.
9. Krygier & Wood (2005) Making maps: a visual guide to map design for GIS
10. MacEachren (1995), How map work
11. Menno-Jan Kraak and Ferjan Ormeling (2020) CARTOGRAPHY: Visualization of Geospatial Data, CRC press.
12. McDonnell. P. W. Jr. (1979): Introduction to Map Projections, Marcel Dekker, Inc New York and Basel.
13. Monmonier, Mark S. (1982), Computer-Assisted Cartography Principles and Prospects, Prentice-Hall, Inc, London
14. Robinson, A.H. et al. (1995): Elements of Cartography, Vol.VI, John Wiley & Sons, New York.
15. Slocum et. Al. (2009), Thematic Cartography and Geovisualization
16. Sabins, Floyd F. (1978): Remote Sensing: Principles and Interpretation, W.H. Freeman & Co., San Francisco.
17. Thomas Lillesand, Ralph W. Kiefer, Jonathan Chipman (1015) Remote Sensing and Image Interpretation, 7th Edition

M.A. / M.Sc. (Geography)

Semester II

Semester II

Title of the Course – Advanced studies in Physical Geography - II								
Year – 1			Semester - II					
Course Type	Course code	Credit Distribution		Credits	Allotted Hours	Allotted Marks		
DSC - 2	GEOG 507	Theory	Practical	04	60	CIE	ESE	Total
		04	00			50	50	100

Course Objectives:

1. To impart knowledge on the earth systems by adopting the system approach.
2. To enhance the understanding of functioning of lithospheric, atmospheric and hydrologic systems.
3. To reveal the importance of various scales of study in earth sciences.

Course Outcomes:

CO 1. The scientific basis for further studies in the field of earth sciences will be developed which will be useful for higher studies/research in this field.

CO 2. The students will be in a position to reflect on the changes in the earth systems and on the global changes in the earth systems.

Unit 1 : Modern Approaches to Geomorphology (15 hours)

- 1.1 Modern approaches and concepts in Geomorphology - General Systems Theory, modern functional approach to geomorphic studies
- 1.2 Temporal and spatial scales of processes of lithospheric processes, concepts of equilibrium, steady, grade and cyclic states in geomorphology
- 1.3 Evolution of geomorphic systems in Quaternary period, effects of recent climate changes on geomorphic systems
- 1.4 Rock cycles, sediment formation, types and stratigraphic studies

Unit 2 : Atmospheric Processes (15 hours)

- 2.1 Atmospheric pressure – vertical and horizontal distribution, General Circulation of atmosphere, Types of winds – Geostrophic, Gradient and local winds
- 2.2 Modern views about Extra-terrestrial wind system, Tricellular meridional circulation, Jet stream; Origin of Monsoon, recent theories of monsoon, factors influencing monsoon
- 2.3 Air masses: Origin, classification, types; Fronts: frontogenesis and frontolysis – classification of fronts; Tropical and Extra-tropical cyclones: formation and impact
- 2.4 Climatic Classification: Koppen and Thornthwaite, concept of water balance Problems and prospect

Unit 3 : Oceanography (15 hours)

- 3.1 Major marine bio-geo-chemical cycles
- 3.2 Ocean sediments- Classification- particle size and source, Marine minerals
- 3.3 Indian Ocean circulation- ENSO: El Niño basic, Tropical pacific climatology, El Niño mechanism
- 3.4 ENSO indices, predictions and teleconnections

Unit 4 : Hydrology (15 hours)

- 4.1 Water budget equation, status of India's water resource
- 4.2 Catchment characteristics, runoff process.
- 4.3 Hydrographs – Introduction, factors affecting runoff Hydrograph, components of a Hydrograph
- 4.4 Ground water – ground water occurrence zones, types and characteristics of aquifers, types of wells

Suggested reading materials:

1. Bierman, Paul R., and David R. Montgomery. Key Concepts in Geomorphology. W.H. Freeman and Company Publishers : A Macmillan Higher Education Company, 2014.
2. Harp, H.J. and Trinidad, O.D. (eds) (1990): Climate and Development, Springer Verlag, U.S.A.
3. Marsh, William M., and Martin M. Kaufman. Physical Geography: Great Systems and Global Environments. Cambridge University Press, 2013.
4. Mather, J. R.(1974): Climatology: Fundamentals and Applications, McGraw Hill Book Co. New York. McBoyle, G.(1973): Climate in Review, Houghton Mifflin Co., Boston.
5. Oliver, J.E. and Hidose, J.J. (1984): Climatology - An Introduction, Charles and Merrill, U.S.A. Robinson, P.J. and Hendersen-Sellers, A.(1999): Contemporary Climatology, Pearson Education, London
6. Subrahmanyam, V.P.(ed)(1983):Contribution to Indian Geography, Heritage Publishers, New Delhi , a) Vol. III - General Climatology b) Vol. IV- Applied Climatology
7. Von Elverfeldt, Kirsten, and Thomas Glade. "Systems Theory in Geomorphology A Challenge." Zeitschrift Für Geomorphologie, Supplementary Issues, vol. 55, no. 3, June 2011, pp. 87–108. DOI.org (Crossref), <https://doi.org/10.1127/0372-8854/2011/0055S3-0053>.
8. Ahrens, C. D., & Henson, R. (2018). *Meteorology Today: An Introduction to Weather, Climate and the Environment*. Cengage Learning.
9. Ahrens, C. D. (2023). *Essentials of Meteorology: An Invitation to the Atmosphere*. Cengage Learning.
10. Dingman, S. L. (2015). *Physical Hydrology*. 2nd edition, Prentice Hall.
11. Garrison, T. (1995). *Essentials of Oceanography*. 6th edition, Cengage Learning. <https://ci.nii.ac.jp/ncid/BA70819455>
12. Hawkins, S. J., Allcock, A. L., Bates, A. E., Firth, L. B., Smith, I. P., Swearer, S. E., & Todd, P. A. (2019). *Oceanography and Marine Biology: An annual review*. Volume 57. CRC Press.
13. Hornberger, G. M., Wiberg, P. L., Raffensperger, J. P., & D'Odorico, P. (2014). *Elements of Physical Hydrology*. The Jhon Hopkins University Press, Maryland, USA.
14. Singh, V. P. (1992). *Elementary Hydrology*. Pearson College Division.
15. Subramanya, K. (2013). *Engineering Hydrology*, Tata Mc-Graw Hill.
16. Todd, D. K., & Mays, L. W. (2004). *Groundwater Hydrology*. John Wiley & Sons.
17. Viessman, W., & Lewis, G. L. (2003). *Introduction to Hydrology*. Pearson.

Title of the Course – Advanced studies in Human Geography - II								
Year – 1			Semester - II					
Course Type	Course code	Credit Distribution		Credits	Allotted Hours	Allotted Marks		
DSC - 2	GEOG 508	Theory	Practical	04	60	CIE	ESE	Total
		04	00			50	50	100

Course Objectives:

1. To explore the spatial organisation of economy at local, regional, national and international levels and its interconnectedness to grasp the spatial patterns of development and underdevelopment
2. To study the geography of social, cultural and political processes
3. To understand the evolution of human geography and geographical thoughts and its nature and scope
4. to understand the specific dimension of society in terms of race, language, religion, gender and pattern of their distribution
5. to analyse historical, modern processes that shape cultures, politics and society
6. understanding of implications of globalisation as a major force on economy, society and culture

Course Outcomes:

- CO 1. The students are expected to become well versed with the complex nature of human societies and develop a holistic understanding.
- CO 2. Issue based analysis and problem solving approaches would be learned by the students.
- CO 3. Student are expected to develop scientific approach through logical and rational thinking

Unit 1: Modern Geographical Thought

(15 Hours)

- 1.1 Dualisms in Geographic Studies (physical vs. human, regional vs. systematic, qualitative vs. quantitative, idiographic vs. nomothetic),
- 1.2 Paradigm Shift-Kuhn's concept, evolution of principal ideas/ perspectives in Geography- Positivism, Radicalism, Behaviouralism, Humanism, Structuralism, Feminism and Postmodernism - Deconstruction
- 1.3 Welfare Approach - who, what, where and how- territorial social indicators - social justice.

Unit 2: Social and Cultural Geography

(15 Hours)

- 2.1 Evolution and development of Social and cultural Geography – Major Trends and Approaches- Critical Perspective and Associated Theoretical Developments
- 2.2 Traditional cultural geography – New cultural geography -linguistic and literary studies, Semiotic analysis and 'space' theories - critical social theory
- 2.3 Emergence and development of early cultural hearth – cultural diffusion, isolation and segregation - Ethnicity - Race, Language, Religion
- 2.4 Implications of race, religion, language and ethnicity- Contestation, conflicts and negotiations

Unit 3: Gender and Geography

(15 Hours)

- 3.1 Structuring of sexuality and construction of gender identity – Gender binaries - Transgender and LGBTQA+ - role of socio-cultural forces and processes- stigmas and taboos – resultant gendered spaces-Indian examples
- 3.2 Spatiality of sex ratios – intra-regional and inter-regional – specific examples of India and China -

- feminization of labor and status of women workers – transgender and economic space
3.3 Gender and human development status – Human rights and legal gender space - Indian context
3.4 Concepts of Gender Audit - Gender budget - Gender mainstreaming

Unit 4 : Spatial Dynamics of Political Processes

(15 Hours)

- 4.1 Concepts and images of territoriality, state, nation and nation- state - colonialism and post-colonial context
4.2 Theoretical perspectives on global political structure- critical analysis of heart land and rim land theories - Relevance of World Systems approach- Core-periphery structure
4.3 Boundary and Frontier concepts- Terrestrial and maritime context- Processes of boundary formation- cultural and ethnic identities.
4.4 Dynamics of electoral politics- Indian context - Globalisation and contemporary geopolitics - Politics of resources – oil resources and West Asia – water Resources and South Asia

Suggested Reading Materials:

1. Adhikari, S. (1992). *Fundamentals of Geographical Thought*. Chaitanya Publishing House
2. Smith, D.M. (1977). *Human geography: a welfare approach*. Edward Arnold.
3. Dikshit, R.D. (2012). *The Art and Science of Geography: Integrated Readings*. PHI learning Private Limited.
4. Harvey, D. (1969). *Explanation in Geography*. Edward Arnold.
5. Johnston, R.J. et.al. (ed.) (1986). *The Dictionary of Human Geography*. Blackwell.
6. Peet, R. (1998). *Modern Geographical Thought*. Blackwell
7. Peet, R. and Thrift, N. (eds.) (2002). *New Models in Geography*. Unwin Hyman.
8. Kitchin R., Thrift, N, (eds.) (2009), *The International Encyclopedia of Human Geography*, Elsevier.
9. Glassner, M L, De Blij, H, J, Yacher, L. (1980): *Systematic Political Geography*, John Wiley.
10. Dear J. Michael and Flusty Steven, (eds.) (2002): *The Spaces of Post Modernity*, Blackwell, Massachusetts.
11. Benko Georges and Strohmayer Ulf, (eds.) (2004): *Human Geography- A History for the 21st Century*, Arnold, London.
12. Atkinson, D., Jackson, P., Sibley, D. and Washbourne, N. (eds.) (2005), *Cultural Geography, A Critical Geography of Key Concepts*, Tauris, I.B.
13. Cloke, P., Crang, P., Goodwin, M.,(2004), *Envisioning Human Geographies*, Arnold.
14. Cloke Paul, Crang Philip and Goodwin Mark, (eds.) (1999): *Introducing Human Geographies*, Arnold, London.
15. Banerjee-Guha, S. (2004), *Space, Society and Geography*, Rawat, New Delhi.
16. Banerjee- Guha Swapna: *Space, Spatiality, Human Geography and Social Science: Politics of the production of Space*, Published in *Transaction Institute of Indian Geographers*, Vol.33, No.1, Winter 2011, pp 3-22, Pune.

Title of the Course – Tools and Techniques of Geographical Analysis								
Year – 1			Semester - II					
Course Type	Course code	Credit Distribution		Credits	Allotted Hours	Allotted Marks		
DSC - 2	GEOG 509	Theory	Practical	04	120	CIE	ESE	Total
		00	04			00	100	100

Course Objectives:

1. Main objective is to get acquainted with various geographical tools useful for analysis of various geographical and human landscapes and development

Course Outcomes:

At the end of the practical course students must be able to practically:

CO 1. The students are expected to learn how various geographical tools can be used for geographical analysis.

CO 2. Student will get acquainted with various types of geographical resources like maps, aerial photographs, satellite imageries and so on. The same will offer them to develop the skills that are required in spatial planning and development.

Unit 1 : S.O.I. Topographical Maps:

(30 Hours)

1.1 Introduction Index to sheet- Scales- Conventional signs and symbols

1.2 Study and interpretation of topographical maps with reference to:

- i. Glacial; Fluvial, Aeolian and Coastal landforms
- ii. Drainage pattern
- iii. Land-use
- iv. Settlement
- v. Transport and Communication

1.3 Study and interpretation of O.S sheets and USGS maps and Land-use.

Unit 2 : Aerial photography and geomorphic setup:

(30 Hours)

2.1 Aerial Photography: Construction of stereo vision, Photo Interpretation and preparation of photo map, Determination and application of scale for distance, area and Determination height. Image Interpretation, Conjunctive use of Map, Aerial Photographs and Satellite Imagery

2.2 Interpreting the geomorphic setups in the field, on maps and satellite images

Unit 3 : Techniques of Soil and Sediment Analysis:

(30 Hours)

3.1 Soil profile, Weathering profile and Sedimentary Facies.

3.2 Textural analysis: Sieve analysis laboratory procedure; PHI, Millimeter and Microns Scale-Grade; Methods of graphic representation of data-Histogram, Frequency curve, cumulative arithmetic and probability curve; Measures; Formulae for statistical parameters of grain size and interpretation.

3.3 The soil textural triangle: Drawing sand, silt and clay on triangular graph paper, identification of soil type and interpretation.

3.4 Chemical Analysis –pH, EC, Organic carbon, Colour and percentage of soil moisture determination.

Unit 4 : Techniques in Human Geography

(30 Hours)

4.1 Network Analysis:

a) Topological graphs -Connectivity- Calculations of Alpha, Beta and Gamma Indices.

b) Mapping of relative accessibility and connectivity – Matrices- point of minimum Aggregate travel distance

4.2 Measuring development: Choice and relevance of indicators - Calibration of ratios and indices; Construction of diagrams and maps - Mapping and interpretation of Levels of development, Regional imbalance, Gender gap

Suggested Reading Materials:

1. Robinson, A. H. and Others (1995): Elements of Cartography, VI Edition, John Wiley & Sons, New York.
2. Anson, R. W. and Ormeling, F. J., (Ed.) (1993): Basic Cartography for Students and Technicians, Vol.I, International Cartographic Association and Elsevier Applied Science Publishers, London.
3. Dickinson, G. C. (1977) Statistical Mapping and the Presentation of Statistics, Edward Arnold Ltd., London.
4. Monkhouse, F. J. and H. R. Wilkinson, (1971): Maps and Diagrams, Methuen & Co. Ltd., London.
5. Hodgkiss, A. G. (1970): Maps for Books and Theses, David and Charles Publishers Ltd., London.
6. Misra R. P. and A. Ramesh, (1969): Fundamentals of Cartography, Prasaranga, University of Mysore
7. Young, P. V. and Schmid, C. F. (1979) : Scientific Social Surveys and Research, nlice Hall, New Delhi.
- 8 . Mahmood Aslam (1977), Statistical Methods in Geographical Studies, Rajesh Publication, New Delhi.
9. Hammond,R. and McCullagh,P.S. (1974), Quantitative Techniques in Geography: An Introduction, Oxford University Press, London.
10. Yeates, M (1974), An Introduction to Quantitative Analysis in Human Geography, McGraw Hill Book Co., New York.
11. Cole, J. P. and King, C. A. M., (1968), Quantitative Geography, John Wiley and Sons, London.
12. Fotheringham,A.S., Brunson, C., Charlton,M ,(2000) Quantitative Geography: Perspectives on Spatial Data Analysis, Sage Publication Ltd, London,
- 13 . Baily,T.C., and Gatrell, A. C, (1995), Interactive Spatial Data Analysis, Prentice Hall, London
14. Griffith ,D. A. , Layne, L.J.,(2002) A Casebook for Spatial Statistical Data Analysis: A Compilation of Analyses of Different Thematic Data Sets , Amazon.com
15. Wicox, P.R. (2003), Applying Contemporary Statistical Techniques, Academic Press, Amsterdam
16. Crang M. and Cook, I. 2007, Doing Ethnographies, Sage.

Title of the Course – Advanced Methods of Land Surveying, Mapping and Cartography								
Year – 1			Semester - II					
Course Type	Course code	Credit Distribution		Credits	Allotted Hours	Allotted Marks		
DSC - 2	GEOG 511	Theory	Practical	02	60	CIE	ESE	Total
		00	02			00	50	50

Course Objectives:

1. To get an understanding about various surveying instruments, its applications and data collection methods.

Course outcome:

After completion of this practical paper students will be able to

CO 1. calibration and handling of surveying instruments

CO 2. applications of surveying instruments

CO 3. applications of online utility to create maps and profile from geographical data iv) sources of mobile data collection platforms.

Unit 1: Application of Theodolite /Plane Table Survey (15 Hours)

1.1 Definition of Surveying, Duties & Responsibilities of a Surveyor as per Government Regulation.

1.2 Theodolite- Tachometry, Height & distance, Curve setting problems (Compound, Reverse & Transition), Traversing & Triangulation survey: Principle, Planning & Methods. Geodesy;

1.3 Types of Scale, Linear and Angular Measurements, Area & Volume – Calculations, Levelling, Contouring - Trigonometry & Rectangular Coordinate calculations - True North determination, Triangulation.

1.4 Plane Table Survey-Radiation, Intersection, Traversing, Resection

Unit 2: Application of GPS (dGPS) /UAV (15 Hours)

2.1 Introduction to Differential GPS (dGPS) /UAV-

2.2 Principle and Functions

2.3 Practical exercises based on GPS

Unit 3 : Introduction to Total Station (15 Hours)

3.1 Principle and Function.

3.2 Process of data collection and analysis

3.3 Application of Total Station in Various Fields

3.4 Practical Exercises based on Total Station

Unit 4 : Applications of Apps and Data collection forms (15 Hours)

4.1 GPS Visualiser

4.2 Google Earth Explorer

4.3 Questionnaire framing

4.4.Google Form, ODK apps/NVIVO apps

Suggested Reading Materials:

- (1) Surveying – Vol –II – By B.C. Punmia, A K Jain and A K Jain, Laxmi Publishers
- (2) Higher Surveying – Vol –II By B.C. Punmia, A K Jain and A K Jain, Laxmi Publishers
- (3) Surveying – Vol – I – By S.K.Duggal, Tata McGraw Hill Book Co.
- (4) Surveying – Vol – II – By S.K. Duggal, Tata McGraw Hill Book Co.
- (5) Advanced Practical Geography by Pijushkanti Saha, Partha Basu, Books and allied (P) Ltd.

Specialisation I : Physical Geography and Earth Systems

Title of the Course – Remote Sensing and GIS for Water Resources								
Year – 1			Semester - II					
Course Type	Course code	Credit Distribution		Credits	Allotted Hours	Allotted Marks		
DSE - 2	GEOG 51201	Theory	Practical	04	60	CIE	ESE	Total
		04	00			50	50	100

Course Objectives:

1. To Teach Students Remote Sensing and GIS in context of water resources.
2. At the end of course students will understand the importance of Remote Sensing and GIS in water resources field.
3. Students will understand importance of Remote sensing and GIS in the solving of spatial problems in water resources.

Course Outcomes:

After completion of this course students will:

CO 1. Theoretical explanation on principles of remote sensing, satellite imaging and information extraction.

CO 2. Functional elucidation of integration of GIS and satellite data product.

CO 3. Student will learn how Remote sensing and GIS is useful in solving problems of water resources.

Unit 1: Remote Sensing

(15 Hours)

- 1.1 Energy Source and Radiation principles- Energy interaction with atmosphere and Earth Surface feature- Data Acquisition and Digital Image
- 1.2 Remote sensing platforms- Monitoring Satellites – Landsat, Sentinel etc.
- 1.3 Satellite data analysis –visual image interpretation-
- 1.4 Image enhancement and classification

Unit 2: Data Sources

(15 Hours)

- 2.1 Remote Sensing data and GIS data
- 2.2 Meteorological data
- 2.3 Hydro-observation data
- 2.4 Climate Change data

Unit 3: GIS

(15 Hours)

- 3.1 Definition- components of GIS- Map projection and Coordinate System- data Structures – Topology
- 3.2 Geodatabase models- common sources of error –data quality
- 3.3 Measurement in GIS- Length, perimeter, areas- Reclassification
- 3.4 Neighborhood functions- Map overlay

Unit 4: Water Resources Applications

(15 Hours)

- 4.1 Water quantity and distribution
- 4.2 Site selection for Artificial recharge -Water Quality
- 4.3 Flood inundation mapping and Modeling

4.4 Drought Monitoring

Suggested reading materials:

1. Avery, T.E., and G.L. Berlin, (1992) *Fundamentals of Remote Sensing and Air photo Interpretation*, New York: Macmillan.
2. Burrough P.A. and McDonnell R.A., (1998) *Principles of Geographical Information Systems*, Oxford University Press. New York.
3. Campbell, J.B., (2002) *Introduction to Remote Sensing*, 3rd ed., New York: Guilford Press.
4. Chang, K, (2020) “*Introduction to Geographical Systems*”, 4th Edition, Tata McGraw-Hill.
5. DeMers, M.N., (209)“*Fundamentals of Geographical Information Systems*”, 3rd Edition, John Wiley & Sons.
6. Elachi, C., (1987) *Introduction to the Physics and Techniques of Remote Sensing*, Hoboken, NJ: Wiley.
7. Ian Heywood Sarah, Cornelius and Steve Carver (2002) *An Introduction to Geographical Information Systems*. Pearson Education. New Delhi.
8. Irons, J.R., J.L. Dwyer, and J.A. Barsi, (2012) “The Next Landsat Satellite: The Landsat Data Continuity Mission,” *Remote Sensing of Environment*, vol. 122.
9. Jensen, J.R., and R.R. Jensen, (2013) *Introductory Geographic Information Systems*, Glenview, IL: Pearson Education, Inc.
10. Lillesand, T.M. and Kiefer, R.W., (1993) *Remote Sensing and Image Interpretation III Edition*. John Wiley and Sons, New York.

Title of the Course – Fluvial Geomorphology								
Year – 1			Semester - II					
Course Type	Course code	Credit Distribution		Credits	Allotted Hours	Allotted Marks		
DSE - 2	GEOG 51202	Theory	Practical	04	60	CIE	ESE	Total
		04	00			50	50	100

Course Objectives:

1. To develop the skill of assessing the drainage basins and stream networks for watershed management.
2. To give an idea about the nature and patterns of streams and flows.
3. To enlighten on watershed management, GIS-based estimation of erosion and the scope and prospects of multipurpose projects

Course Outcomes: The students will be able to:

- CO 1. Delineate watersheds, differentiate them on the basis of their morphological properties.
CO 2. Know the techniques of estimation of soil erosion using GIS techniques.
CO 3. Develop a model for watershed development.

Unit 1 : Rivers and River basins

(15 hours)

- 1.1 Definition, nature and scope of fluvial geomorphology
- 1.2 Components of drainage basins, basin development theory by Glock (1932), laws of drainage network composition by Horton (1945)
- 1.3 Drainage patterns, factors controlling drainage patterns, hierarchy of drainage basins (Basins, Watershed, Mini watershed, micro watershed)
- 1.4 Major water regions and drainage basins in India – case studies, effect of climate change in fluvial regimes

Unit 2 : Channel forms and processes

(15 hours)

- 2.1 Stream types: based on structure, time and flow duration; stream classification systems by Schumm and Rosgen
- 2.2 Channel patterns: straight, meandering (pools and riffles), braided and anastomosing
- 2.3 Hydraulic geometry: at a station and downstream; Channel cross section - flow characteristics, isovel patterns
- 2.4 Longitudinal profile of river: concept of grade and graded profile, dynamic equilibrium, river rejuvenation

Unit 3 : Hydraulics of channel flow

(15 hours)

- 3.1 Types of open channel flow: Laminar-Turbulent, subcritical-supercritical, flow mechanism, Reynold and Froude numbers, water budget and water flow
- 3.2 Concept of stream carrying capacity and competence, stream power and specific energy, stream energy,
- 3.3 Flow resistance: mean velocity, Chezy equation and Manning formula; Forms of channel resistance
- 3.4 Sediment transport, sediment yield and watershed effects

Unit 4 : Watershed management

(15 hours)

- 4.1 Watershed management – concept, definition, scope, practices, objectives
- 4.2 Fluvial erosion and GIS-based models of erosion estimation, effects of excessive erosion
- 4.3 River channel management and restoration – scope and methods, case studies in India and Maharashtra
- 4.4 Multipurpose river projects – flood control measures, harnessing hydroelectric power rivers as lines of transportation, river-front development plans – concerns and prospects in India

Suggested Reading materials:

1. Bridge, J., & Demico, R. (2008). *Earth surface processes, landforms and sediment deposits*. Cambridge University Press.
2. Carbonneau, P. E., & Piegay, H. (2012). *Fluvial remote sensing for science and management*. Wiley-Blackwell.
3. Charlton, R. (2007). *Fundamentals of fluvial geomorphology, 2007*.
4. Chaudhury, M. H. (2008). *Open channel flow*. Springer.
5. Crickmay C. H. (1974). *The work of the river olin Hayter*. American Elsevier Publishing Company.
6. Downs, P. W., & Gregory, K. J. (2004): *River Channel Management*. Arnold.
7. Faniran, A., & Jeje, L. K. (1983). *Humid tropical geomorphology*. Longman.
8. Fryirs, K. A., & Brierley, G. J. (2012). *Geomorphic analysis of river systems: An approach to reading the landscape*. Wiley.
9. Hickin, E. J. (1995). *River geomorphology*. Wiley-Blackwell.
10. Jarvis () Network analysis.
11. Jarvis, R. S. (1977). Drainage network analysis. *Progress in Physical Geography: Earth and Environment*, 1(2), 271–295. <https://doi.org/10.1177/030913337700100203>
12. Kale, V. S., & Gupta, A. (2001). *Introduction to geomorphology*. Orient Longman.
13. Leopold, L. B., Wolman, M. G., & Miller, J. P. (1964). *Fluvial processes in geomorphology*, W. H. Freeman, san Franscisco.
14. Maiti, R. (2016). *Modern approaches to fluvial geomorphology*.
15. Miall, A. (2014). *Fluvial depositional systems*. Springer.
16. Morisawa, M. (1968). *Streams: Their dynamics and morphology*. McGraw-Hill.
17. Richards, K. (1982). *Rivers: Form and processes in Alluvial Channels*. Methuen.
18. Richards, K. (2004). *Rivers: Form and process of alluvial Channels*.
19. Robert, A. (2003). *River processes- an introduction to fluvial dynamics*. Arnold.
20. Rosgen, D. (1996). *Applied river morphology, Wild land Hydrology, Fort Collins, Colorado*.
21. Schumm, S. A. (1972). *River morphology* (3rd ed). Dowden, Hutchinson & Ross, the University of California.
22. Schumm, S. A. (1977). *Fluvial systems*. Wiley.
23. Schumm, S. A., & Khan, H. R. (1972). Experimental study of channel patterns. *Geological Society of America Bulletin*, 83, 1755–1770.
24. Sear, D. A., Newson, M. D., & Thorne, C. R. (2003): *Guidebook of applied fluvial geomorphology*, (Tech)
25. Sepehri, M., Ghahramani, A., Kiani-Harchegani, M., Ildoromi, A. R., Talebi, A., & Rodrigo-Comino, J. (2021). Assessment of drainage network analysis methods to rank sediment yield hotspots. *Hydrological Sciences Journal*, 66(5, April), 904–918.org (Crossref). <https://doi.org/10.1080/02626667.2021.1899183>

Other web resources: <https://archive.nptel.ac.in/courses/105/101/105101010/>

Title of the Course – Earthquake Studies and Seismic Hazard Management								
Year – 1			Semester - II					
Course Type	Course code	Credit Distribution		Credits	Allotted Hours	Allotted Marks		
DSE - 2	GEOG 51203	Theory	Practical	04	60	CIE	ESE	Total
		04	00			50	50	100

Course Objectives:

1. To impart knowledge on the mechanism of earthquakes and earthquake processes and related concepts – seismic waves, magnitude, measurement of magnitude.
2. To give an idea about the processing of seismic data, seismic precursors and their applications
3. To enhance the understanding about the seismogenic regions of the world including India, by discussing the seismotectonic characteristics of these regions and major events.
4. To create awareness about the seismic disaster management and levels of preparedness all over the world.

Course Outcomes:

After completing this course, the students will be able to

CO 1. delineate the seismotectonic regions and prepare the earthquake distribution maps

CO 2. read and interpret the fault plane solutions and seismographs

CO 3. apply some precursors on seismic data sets and interpret the result

CO 4. prepare disaster management plans – personal and community level

Unit 1 : Earthquake Science and seismic hazard management (15 hours)

- 1.1 Plate tectonics, seismicity, faults and fault mechanisms, fault plane solutions, type of earthquakes,
- 1.2 Seismic waves – types and propagation, attenuation of wave amplitude with distance, directivity pulse;
- 1.3 Measurement of Earthquakes: seismograph and accelerometer, scales of measuring earthquake magnitude, determining the location and size of earthquake event,
- 1.4 Defining seismotectonic regions, characteristics of various seismogenic regions of the world, major seismic events and the nature of tectonics associated with the seismic events

Unit 2 : Seismic data processing and applications (15 hours)

- 2.1 Seismic data processing – filtering the data and baseline correction, spectrum compatible ground motion, Power spectral density function, Ground motion intensity measure;
- 2.2 Strong Motion Characterization: Peak ground acceleration, Strong motion duration, Response spectrum, Fourier spectrum, Factors affecting ground motion characteristics at a site, Attenuation laws
- 2.3 Magnitude- Frequency relationship – Richter-Gutenberg Equation (b-value computation), Magnitude-Recurrence relationship, Magnitude-depth relationships
- 2.4 Mechanism of tsunamis, tsunami early warning system, major tsunami event in the historic time period.

Unit 3 : Seismic Precursors, Hazard and Vulnerability Assessment (15 hours)

- 3.1 Seismic precursors – concept and reality, types – based on time and nature

- 3.3 Application of precursors (seismic gap, 'b' value) to seismic data sets
- 3.3 Seismic Hazard Assessment: Seismic history and identification of sources
- 3.4 Seismic vulnerability assessment seismic micro-zonation – concept and methods (p – value, PG, type of weathered material), Rapid visual surveys and building design and construction in highly seismic zones, retrofitting of buildings, applications of GIS and remote sensing for hazard and vulnerability assessment

Unit 4: Global Seismotectonics and Levels of preparedness (15 hours)

- 4.1 Seismotectonics of the Indian plate and seismogenic regions of India, major seismic events in India and its surroundings, major seismic events in India.
- 4.2 Seismic disaster management - preparedness, mitigation, response and rescue and rehabilitation, risk assessment techniques
- 4.3 The levels of preparedness in various seismogenic regions – Japanese region, North American region, South American region, African region, Europe, South East Asian region, Australian region and Indian and its environs.
- 4.4 Personal preparedness – communication, security, authority, first aid, environmental concerns and tools, preparation of disaster plans - personal/family-level, community-level.

Suggested Reading Materials:

1. Baker, J. W. et al. (2021). *Probabilistic seismic hazard and risk analysis*. Cambridge University Press.
2. Baker, J., Bradley, B., & Stafford, P. (2021). *Seismic Hazard and Risk Analysis* (pp. V-Viii). Cambridge: Cambridge University Press.
3. Booth, E. D., & Key, D. (2006). *Earthquake design practice for buildings* (2nd ed). Thomas Telford.
4. Elnashai, A. S., & Di Sarno, L. (2008). *Fundamentals of earthquake engineering*. Wiley.
5. Hudson, D. E. (1995). Dynamics of structures: Theory and applications to earthquake engineering, by Anil K. Chopra, Prentice-Hall, Englewood Cliffs, NJ, 1995. No. of pages: Xxviii + 761, ISBN 0-13-855214–2. *Earthquake Engineering and Structural Dynamics*. Prentice Hall, ISBN 0-13-855214-2, 24(8, August), 1173–1173.org (Crossref). <https://doi.org/10.1002/eqe.4290240809>
6. Muir-Wood, R. (1993). From global seismotectonics to global seismic hazard. *Annals of Geophysics*, 36(3–4, December), 10.org (Crossref). <https://doi.org/10.4401/ag-4261>
7. Panza, G. F., & Giuliano, F. (Eds.). (2011). *Advanced seismic hazard assessment*. Birkhauser Verlag.
8. Pinter, N., & Keller, E. A. (1996). *Exercises in active tectonics: An introduction to earthquakes and tectonic geomorphology*. Prentice Hall.
9. Stein, S., & Wysession, M. (2003). *An introduction to seismology, earthquakes, and earth structure*. Blackwell Publishing.
10. Sucuoğlu, H., & Akkar, S. (2014). *Basic earthquake engineering: From seismology to analysis and design*. Springer.
11. Tsapanos, T. M., & Burton, P. W. (1991). Seismic hazard evaluation for specific seismic regions of the world. *Tectonophysics*, 194(1–2, July), 153–169.org (Crossref). [https://doi.org/10.1016/0040-1951\(91\)90278-Z](https://doi.org/10.1016/0040-1951(91)90278-Z)

Specialisation II: Urban and Regional Planning and Development

Title of the Course – Basic Elements of Urban and Regional Planning								
Year – 1			Semester - II					
Course Type	Course code	Credit Distribution		Credits	Allotted Hours	Allotted Marks		
DSE - 2	GEOG 51204	Theory	Practical	04	60	CIE	ESE	Total
		04	00			50	50	100

Course Objectives:

1. The course is designed to make the students understand the basic element of spatial planning
2. The course offers a detailed discussion on different approaches, methods, issues and problems in planning

Course Outcomes:

- CO 1. The students are expected to develop in depth understanding about urban planning as well as regional planning.
- CO 2. The course would also expose them to various geographical datasets that are required for urban planning

Unit 1 : Introduction to Urban Planning (15 Hours)

- 1.1 Urban Planning stages and system, basic concepts and principles, needs of planning –Rationales and primary functions of planning
- 1.2 Types and scale of urban planning – Methods of Urban planning
- 1.3 Understanding the concepts and making of Base Maps, Cadastral Maps, Land records, development plans, master plans – Land Information System
- 1.4 Integration of data from different sources and use of Geospatial Technologies

Unit 2 : Governance Structure and Urban Planning in India (15 Hours)

- 2.1 Evolution of Planning legislation in India - An overview of legal tools connected with urban planning and development, Town and country planning act
- 2.2 Economic concept of land - economic principles of land use - economic rent land use pattern and land values - location economics -financial balance sheet of land development –Land and its different uses
- 2.3 Registration of land and land record procedure - factors influencing land value - assessment and prediction of land value and its prices - economics of Town Planning decisions effects of legislation on land development and urban land economics.
- 2.3 Institutions and Urban planning - Typology of institutions - their role, powers and significance (legal, political, social, cultural and economic institutions), formal and informal institutions – their interface, conflicts, classified work, and their effectiveness in planning: Analysing the institutions: Methods, process and evaluation.

Unit 3 : Environmental Planning, Environmental Impact Assessment and Environmental Management System (15 Hours)

- 3.1 Environmental planning – types of planning – planning processes and tools –indicators of sustainability in planning and development of settlements, natural resource utilization

- 3.2 Environmental Impact Analysis - Evaluation and its parameters – procedural and administrative aspects of EIA – methods and EIA matrices and networks – techniques of assessment– appraisal
- 3.3 Environmental ethics, laws and management –principles of ecological approach to urban and regional planning –environmental design in the context of natural resource management –public awareness and accountability
- 3.4 Environmental management systems –cleaner production and cleaner technologies – energy accounting and auditing – use of alternative sources – energy policies – norms and standards of clean air and water- reuse and recycling

Unit 4 : Financial Planning

(15 Hours)

- 4.1 Financial Planning and techniques - Public finance and resource mobilization: Some basic principles
- 4.2 Review of centre, state and local financial relationships – fiscal and financial freedoms - limitations – role of finance commission - procedures and method of financing
- 4.3 Review of accounting practices, budgetary procedures for capital works - Policies and procedure for raising financial resources
- 4.4 Techniques of monitoring the development of specific works - standard oriented costs control, turnkey system, vertical production method, inventory cost control techniques, and unified status, index techniques

Suggested Reading Materials:

1. Bagchi, S (2000): Financial Implications of Decentralisation: Issues Concerning Resource Mobilisation by Urban Local Bodies; *ArthVijnana* Vol.XLII; No.4.
2. Bagchi, S (2001): Financing Capital Investments in Urban Infrastructure: Constraints in Accessing Capital Investments in Urban Basic Services; *Economic and Political Weekly*; Vol.XXXVI; No.4.
3. Bagchi, S (2001): Private Provision of Public Utilities: Some Issues and Evidences from Indian Water and Sanitation Sector; *Nagarlok*; Vol.XXXIII; No.3.
4. Bahl, Roy. W (1998): Implementation Rules for Fiscal Decentralisation; Paper presented at the International Seminar on Land Policy and Reform; Taiwan Institute of Land Policy.
5. Bahl, R.W and J.F.Linn (1992). Urban Public Finance in Developing Countries, A World Bank Book, OUP Publication, New York.
6. Carrithers, D. F., and D. Peterson. 2006. “Conflicting Views of Markets and Economic Justice.” *Journal of Business Ethics* 69:373–87.
7. Christensen, K. 1985. “Coping with Uncertainty in Planning” *Journal of the American planning Association* 51 (1): 63–73.
8. Commission of the European Community. 1999. *European Spatial Development Framework (ESDP)—Towards Balanced and Sustainable Development of the Territory of the EU*. Luxembourg: Office for Official Publications of the European Communities.
9. Mäntysalo, R., and I. Saglie. 2010. “Private Influence Preceding Public Involvement: Strategies for Legitimizing Preliminary Partnership Arrangements in Urban Housing Planning in Norway and Finland.” *Planning Theory and Practice* 11 (3):317–38.
10. Adams, W.M. (2001): Green Development: Environment and Sustainability in the Third World, Routledge, London.
11. Agarwal, S.K. and Dubey, P.S. (2002): Environmental Controversies, A.P.H. Publishing Corporations, New Delhi.
12. Basu, D.(ed.)(1995): Environment and Ecology – The Global Challenge, Printwell, Jaipur.
13. Calvert P.S. (1999): The South, the North and the Environment, Pinter, London and New York.
14. Ewusie, J.Y. (1980): ‘Elements of Tropical Ecology’, Heinemann Educational Books Inc. London.
15. Gupta, A. (1988): ‘Ecology and Development in the Third World’, Routledge, London.

Specialisation III: Climate Change and Sustainability Studies

Title of the Course – Basic Elements of Urban and Regional Planning								
Year – 1			Semester - II					
Course Type	Course code	Credit Distribution		Credits	Allotted Hours	Allotted Marks		
DSE - 2	GEOG 51205	Theory	Practical	04	60	CIE	ESE	Total
		04	00			50	50	100

Course Objectives:

1. The course is designed to make students learn various dimensions of sustainability
2. It also offers experiential learning by studying the case studies on sustainable practices

Course Outcomes

- CO 1. Students would learn how sustainability has to be achieved at various levels in an integrated manner
- CO 2. How the sustainability practices can be replicated by adopting local terms and conditions

Unit 1 : Conceptualising Sustainability

(15 Hours)

- 1.1 Sustainability: Meaning and Nature – History of Sustainability – Indian Context
- 1.2 Dimensions of Sustainability: Economic, Socio-cultural dimensions
- 1.3 Dimensions of Sustainability: Psychological and Philosophical Dimensions
- 1.4 Dimensions of Sustainability: Environmental and Ecological

Unit 2 : Sustainability in Perspectives and Space

(15 Hours)

- 2.1 Eastern Perspectives on Sustainability and life style :Buddha, Gandhi, Swami Vivekananda and Tao
- 2.2 Western Perspective on Sustainability - Arne Naess, J. Baird Callicot, George Sessions
- 2.3 Spatial Dimensions of Sustainability – Geography, socio-cultural space and community environmental ethics
- 2.4 Traditional Knowledge Systems and environmental sustainability

Unit 3 : Politics of Sustainability

(15 Hours)

- 3.1 Role of International agencies in promoting sustainability – UN, UNEP, UNFCCC, etc.
- 3.2 Critical analysis of Millennium Development Goals to Sustainable Development Goals
- 3.3 Role of supranational institutions in shaping the perspectives on sustainability - international capital, global economic circuits, and sustainability
- 3.4 critical analysis of global efforts on climate change and sustainability – Critical analysis of policies on sustainable development in India

Unit 4 : Approaches to Sustainable Development

(15 Hours)

- 4.1 Modifying Behaviour to Achieve Sustainability: Learning and Pro environmental behaviour theories: Fostering Mindfulness, Gratitude and Hope - Social Norms and Emotional Contagion
- 4.2 System Thinking approach, World Viewing, Future and Design Thinking
- 4.3 Approaches to Sustainable Development: Appraisal of the Environment. Estimation of the Environmental Impact, Natural Resource Accounting, Government policies and Economic Outlook

4.4 Approaches to Sustainable Development: Positivist Approach, human development / opulence oriented approach, Multi-Dimension Approach, Ecosystem Approach and Livelihood Approach

Suggested Reading Materials:

1. Jenkins, R., (1987): Transnational Corporations and Uneven Development, Methuen.
2. Blake, D.H. and Walter, R.S., (1987): The Politics of Global Economic Relations, Prentice Hall.
3. Bagchi, A.K., (1989): The Political Economy of Underdevelopment, Cambridge University Press, 1982, Orient Longman.
5. Archibugi, D. and Michie, J., (eds.), (1997): Technology, Globalisation and Economic Performance, Cambridge University Press.
6. Hoogvelt, A., (1982): Third World in Global Development, Macmillan.
7. Cole, J.P., (1981): Development Gap, John & Wiley and Sons.
8. Kenwood, A.G. and Loughheed, A.L., (1983): The Growth of the International Economy, Alien and Unwin.
9. George, S., (1988): A Fate Worse than Debt, Grove Weidenfeld.
10. Chapman, K., (1979): People, Pattern and Process, Arnold Heinemann.
11. Adams, W.M., (1990): Green Development, Environment and Sustainability in the Third World, Routledge, London.
12. Sachs Wolfgang, (ed.), (1997): The Development Dictionary, Orient Longman.
13. Firoze Manji, (2006): 'Development and Rights', Rawat Publication
14. Hidenori Okahashi, (2008): 'Emerging new industrial spaces and regional development in India', Manohar.
15. D. Jayraj and S. Subramanian, (2010): Poverty, Inequality and population- Essays in Development and Applied Measurement, Oxford
16. Ramchandra Guha and Inequalities, (eds.) (1999): Institutions and Inequalities- essays in Honour of Andre Beteille, Oxford.
17. Ajit Muricken, (1997): 'Globalization and SAP Trends and impact An Overview', Vikas Adhayan Kendra Mumbai

Specialisation IV: Human Geography and Human Ecology

Title of the Course – Geopolitics and South Asia								
Year – 1				Semester - II				
Course Type	Course code	Credit Distribution		Credits	Allotted Hours	Allotted Marks		
DSE - 2	GEOG 51206	Theory	Practical	04	60	CIE	ESE	Total
		04	00			50	50	100

Course Objectives:

1. The objective is to introduce South Asia region in terms of geopolitics to students
2. Discuss crucial issues that are prevailing between South Asian Countries
3. Make the student understand the South Asia as a region

Course Outcomes:

- CO 1. It is expected that being the student of geopolitics the students will be able to formulate an independent understanding on various issues face by the society
- CO 2. The student must understand the geopolitics of South Asia so that they would be able to participate in geostrategy planning.

Unit 1: Historical Context- Organisation of Society (15 Hours)

- 1.1 Historical Background of Colonisation - Impact on social, cultural and political organisation of society
- 1.2 Partition and emergence of independent nation state- Consequences, conflicts and identity politics - Regional Dynamics- Differences and Shared Characteristics
- 1.3 Demographic characteristics language, religion, race - Patterns of Migration assimilation and segregation -contestations and cultural politics
- 1.4 Social, cultural and political institutions their role in shaping identities of people and national identities

Unit 2: Identity Geopolitics : Conflicts and Contestations (15 Hours)

- 2.1 Historical context to ethnic conflicts and contestations – race, religion, caste and class
- 2.2 Border Disputes – Disputes on division of natural resources – various agreements between the nation states in South Asia
- 2.3 Political frontiers and insurgencies – impact of political unrests on society and economy
- 2.4 Terrorism in South Asia

Unit 3: South Asia and External Forces (15 Hours)

- 3.1 Role of USA and USSR in South Asian Nation-states – Foreign policies of Pakistan and India
- 3.2 Impact of Non-State actors in shaping the interrelations between South Asian States - Genesis and trends New economic policy- Globalisation - Role of the MNCs - Growth of services and finance New economic activities and transformation of economic base
- 3.3 Role of China – Finance capital and South Asian States – Challenges to India
- 3.4 Trade relations intra-regional patterns and associations SAPTA success and failure

Unit 4: Dimensions of Regional Development

(15 Hours)

- 4.1 Human Development Index – Understanding the budgetary provisions – expenditures and failures
- 4.2 Regional cooperation - SAARC prospects and challenges Critical assessment of role of India
- 4.3 new inter-regional coalitions and its impact on South Asian Intra-regional interaction AIDB / CPEC / BRICS
- 4.4 Politics of development and resources - Status of development - contemporary modes of governance - Quality of life and index of socio-economic well-being Regional variations

References:

1. Farmer, B. H., (1993): An Introduction to South Asia, (2nd edition), Routledge Publications, London.
2. Johnson, B. L. C., (1981): South Asia (2nd edition), Heinemann Educational Books Ltd., Exeter.
3. Spate, O. H. K. and Learmonth, A.T.A., (1967): India and Pakistan: Land, People and Economy, Methuen, London.
4. Stamp, L.D. (1958): Asia - A Regional and Economic Geography, Methuen & Co. Ltd., Essex Street - Strand, W. C. 2.
5. Tirtha, R. (1996): Geography of India, Rawat, Jaipur.
6. Singh, J., (1997): Agricultural Development in South Asia: A Comparative Study in the Green Revolution Experiences, National Books Organisation, New Delhi.
7. Dash Kishore, C., (2008), Regionalism in South Asia Negotiating Co-operation, institutional structures , Routledge, London.
8. Gonsalves, F. and Jetiy, N, (1999): The Dynamics of South Asia: Regional Co- operation and SAARC, Sage, New Delhi.
9. Mollinga, P.A. (2000): Water for Food and Rural Development: Approaches and Initiatives in South Asia, Sage, New Delhi.
10. Sukhwai, B.L. (1971). India - A Political Geography! Allied Publishers, Bombay.
11. Vidyarthi, L.P. (1979), Patterns of Culture in Southern Asia .
12. Srinivasan, K. and Vlanol, M. (2001). Population-Development Nexus in India: Challenges for the New Millenium, Tata McGraw.
13. Bjorkman, (1987): The Changing Division of Labour in South Asia, Manohar, New Delhi
14. Schwartzberg, J.E. (ed.), (1978): A Historical Atlas of South Asia, University of Chicago Press, Chicago.
12. Eric Gonsalves and Nancy Jetly (1999): The Dynamics of South Asia Regional Cooperation and SAARC,
13. Ahmed, K.S. (1964): Geography of Pakistan, Oxford University Press, Karachi.
14. Ahmed, K.S. (1975): An Economic Geography of Bangladesh, Vikas, New Delhi,
15. Cook. E. K. (1951): Ceylon: Its Geography, Its Resources and Its People, St. Martin, New York.
16. Baldwin, M.F. (1991): Natural Resources of Sri Lanka: Condition and Trends, Colombo.
17. Burton Stein , Sanjay Subrahmanyam. (1996): Institutions and Economic Change in South Asia. Oxford University Press, Waltonn Street , Oxford , New York.
18. South Asia Journal of South Asian Studies, New Series, Vol. XXXII, no. 3 (December 2009)
19. Yogendra K. Malik, Charles H. Kennedy, Robert C. Oberst , Ashok Kapur , Mahendra Lawoti, Syedur Rahman (2009) (6th Edition): Government And Politics In South Asia, Westview Press Boulder , CO 80301
20. B. Ramesh Babu (1998): Globalization And The South Asian State. South Asian Publishers Pvt. Ltd. New Delhi.

Title of the Course – Tourism Development and Planning II								
Year – 1			Semester - II					
Course Type	Course code	Credit Distribution		Credits	Allotted Hours	Allotted Marks		
DSE - 2	GEOG 51207	Theory	Practical	04	60	CIE	ESE	Total
		04	00			50	50	100

Course Objectives :

1. To get an understanding about tourism products and types, planning, development and management of different types of tourist destinations attracting different types of tourists.

Course outcome: After completion of this paper students will be able to

CO 1. identify the various types of tourist attractions

CO 2. comprehend how the various types of tourist attractions can attract different types of tourists

CO 3. assess the status and requirement of tourist infrastructure and amenities

CO 4. understand the process of emergence and development of tourism destinations and their evolution overtime with the infrastructural development

CO 5. planning and management of sustainable tourism destinations

Unit 1 : Tourist attractions& Tourist typologies

(15 Hours)

1.1 Tourism Attractions types-natural, historical, cultural, religious, adventure; functions and meanings of attractions;

1.2 Tourist gaze; sight sacralization;

1.3 Tourist attraction system (Leiper’s model);

Unit 2 : Tourist infrastructure & amenities

(15 Hours)

2.1 Role & significance of good tourist infrastructure;

2.2 Types of infrastructure: Accommodation – types, capacity & amenities; Restaurants & eateries – types of establishments, cuisine types;

2.3 Transport and travel services – transport network, means & modes of transport to and within destination, independent means of travel and mass travel;

2.4 Shopping & recreational facilities; safety & security.

Unit 3 : Tourist Destinations

(15 Hours)

3.1 Types & characteristics; Evolution of tourist destinations –

3.2 Stages of development (Butler’s Tourist Area Life Cycle Model)

3.3 Destination image and branding

Unit 4 : Tourism Development & Planning

(15 Hours)

4.1 Relationship between tourism production and consumption

4.2 Planning & management of tourism destinations -strategic planning

4.3 Comprehensive destination assessment, GSTC destination criteria;

4.4 Smart tourism principles

Suggested Reading Materials:

- 1 Boniface, B.G. and Cooper, C.P. (1987). *The Geography of Travel and Tourism*. Butterworth-Heinemann
- 2 Costa, R.A., Brandao, F., Breda, Z. & Costa, C. (2021). *Planning and managing the Experience Economy in Tourism*. IGI Global.
- 3 Dwyer, L., Forsyth, P. & Dwyer, W. (2010). *Tourism Economics and Policy*, Bristol. Blue Ridge Summit: Channel View Publications <https://doi.org/10.21832/9781845411534>
- 4 Edgell, D.L. Sr. & Swanson, J.R. (2018). *Tourism Policy and Planning: Yesterday, Today and Tomorrow*. Routledge
- 5 Fennell, D. (1999). *Ecotourism: An Introduction*. Routledge.
- 6 MacCannell, D. (1976). *The Tourist: A New Theory of the Leisure Class*. University of California Press
- 7 Pearce, D.G. (1987). *Tourism Today: A Geographical Analysis*. Longman.
- 8 Pearce, D.G. (1989). *Tourism Development*. Longman.
- 9 Rodrigue, Jean- Paul (2020). *The Geography of Transport Systems* (5th Edition). Routledge
- 10 Singh, R. (2007). *Infrastructure of Tourism in India*. Kanishka Publishers.
- 11 Songshan (Sam), H. (2021). Tourist Motivation. In R. Sharpley (Ed.), *Routledge Handbook of the Tourist Experience*. (pp.200-211). Routledge. <https://www.routledgehandbooks.com/doi/10.4324/9781003219866-18>
- 12 Urry, J. (1990) *The Tourist Gaze: Leisure and Travel on Contemporary Societies*. Sage.
- 13 Yoshi S. (2022). *Sustainable Tourism Supply Chain Management: Influence, Drivers, Strategies, and Performance*. Springer.
- 14 Papers
- 15 Butler, R.W. (1980). The concept of a tourist area cycle of evolution: implications for management of tourist resources. *The Canadian Geographer*, 24 (1):5-12.
- 16 Jennie Germann Molz (2022). Tourism geopolitics: assemblages of infrastructure, affect, and imagination. *Journal of Sustainable Tourism*, DOI: 10.1080/09669582.2022.2134402
- 17 Leiper, N. (1990). Tourism Attraction Systems. *Annals of Tourism Research*, 17(3): 367-384
- 18 Pearce, P.L., Morrison, A.M. & Moscardo, G.M. (2003). Individuals as tourist icons: a developmental and marketing analysis. *Journal of Hospitality & Leisure Marketing* 10(1/2):63-85.
- 19 Plog, S.C. (2002). The power of psychographics and the concept of venturesomeness. *Journal of travel Research*, Vol. 40

Title of the Course – Population and Migration Studies II								
Year – 1			Semester - II					
Course Type	Course code	Credit Distribution		Credits	Allotted Hours	Allotted Marks		
DSE - 2	GEOG 51208	Theory	Practical	04	60	CIE	ESE	Total
		04	00			50	50	100

Course Objectives :

1. To get acquainted with basics of population studies along with historical background and sources of Demographic Data.

Course outcome: After completion of this paper students will be able to

CO 1. Learn fundamental concepts in population studies.

CO 2. Able to understand the history of population in terms of growth and trends

CO 3. Examine different sources of demographic data and methods used in data collection.

Unit 1 : Concepts and Theories in Population Geography (15 Hours)

1.1 Population Growth – Attitudes and Interpretations – Malthusian, Neo-Malthusianism and Marxist viewpoint

1.2 Critical Understanding of Demographic transition theory

1.3 Demographic Dividend, Demographic Equation

Unit 2 : Population Trends, Size and Growth (15 Hours)

2.1 World Population Growth- a brief history, Historical Population trends

2.2 Trends and growth of India's population- a brief history

2.3 Population Problems- pre and post independence

2.4 Demographic Profiles of India and States

Unit 3 : Age- Sex Structure (15 Hours)

3.1 Definition: Age and Sex, Sex-Ratio

3.2 Classification of age group and its significance

3.3 Measures of age structure

3.4 Factors affecting age and sex structure

Unit 4 : Types and Sources of Demographic Data (15 Hours)

4.1 Types of Demographic Data

4.2 Different sources of Data

4.3 Population Census in World and India, Vital Registration System, Sample Registration System (SRS), Survey on Causes of Death

4.4 National Sample Survey Organisations Survey (NSSO), National Family Health Survey (NFHS), District Level Household and Facility Survey (DLHS)

Suggested Reading Materials:

1. Aitken, S and Valentine, G. (2006), *Approaches to Human geography*, Sage.
2. Johnston, R.J., Gregory D. Pratt G. and Watts M., (2005, 5th ed.), *the Dictionary of Human Geography*, Blackwell.
3. Henry S. Shryock, Jacob S. Siegel, Elizabeth A. Larmon (1973) *The Methods and Materials of Demography*, Chapters 1, 2, 3, 7, 9,10, Elsevier Science, USA.
4. John Weeks (2005): *Population: An Introduction to Concepts and Issues*, Wordsworth Learning. Singapore 9th edition.
5. Bhende, A. and T. Kanitkar, (2006): *Principles of Population Studies* Himalaya Publishing House, Bombay. 5. United Nations, *World Population Ageing, 1950-2050*
6. Davis, Kingsley (1968) . *The Population of India and Pakistan*, Russell and Russell, New York 7. United Nations (1958). *Multilingual Demographic Dictionary*, John Wiley & Sons Ltd., New York
7. Demko, G, J., Rose, H.M., Schnell, G.A. (1970): *Population Geography: A Reader*, McGraw Hill, New York
8. Clarke, J.I. (1971): *Population Geography and the Developing Countries* .
9. Harper, C.L. (2001): *Environment and Society, Human Perspectives on Environmental Issues*, Prentice Hall, New Jersey.
10. Ehrlich. P.R., and Ehrlich, A.M.(1992): *Population Explosion, Doomsday*, New York.
11. Saare, P. and Blunder, J. (eds.) (1995): *An Overcrowded World? Population, Resources and Environment*, The Open University, Oxford.
12. Johnston, R.J. and Taylor, P. (eds.): *The World in Crisis*, Oxford: Blackwell.
13. Potter, R.B., Binns, T., Elliott, J.A. and Smith, D. (1999): *Geography of Development*, Longman.
14. Srinivas, K. and Vlanol, M, (2001): *Population, Development Nexus in India: Challenges for the New Millenium*, Tata McGraw Hill, New Delhi.
15. Ackermann, E.A. (1959): *Population and Natural Resources in Hauser, P.M. and Duncan, O.D,(eds.) The Study of Population*, Chicago

Title of the Course – Socio-Cultural Geographies II								
Year – 1			Semester - II					
Course Type	Course code	Credit Distribution		Credits	Allotted Hours	Allotted Marks		
DSE - 2	GEOG 51209	Theory	Practical	04	60	CIE	ESE	Total
		04	00			50	50	100

Course Objective:

1. To acquaint students about the urban social and cultural spaces with special reference to India
2. To introduce to students the roles and importance of culture and social structures in the socio-spatiality of cities
3. To acquaint the students about social and cultural segregations and division of urban spaces and how to address the same

Course Outcome:

The students will develop

- CO 1. An understanding of Importance and role of social structure in city's social formation or urban sociality
- CO 2. Skills to measure social and spatial segregations through Dissimilarity Index and Entropy Index
- CO 3. An understanding of policy measures and how to design the same to address the urban social and cultural problems

Unit 1 : Urban Social Geography

(15 Hours)

- 1.1 Urban Social Geography and Socio-Spatial Dialectics
- 1.2 Approaches to understanding the spaces
- 1.3 Socio-spatial dialectics
- 1.4 Micro-geographies of the cities

Unit 2 : Culture of the Cities

(15 Hours)

- 2.1 Culture of cities: meaning of culture
- 2.2 Cultural diversities; religious places and secular spaces; hybridity
- 2.3 Social construction of spaces and spatial identities

Unit 3 : Spatial Segregation and Exclusion

(15 Hours)

- 3.1 Spatial Segregation and Exclusion
- 3.2 Measures of social exclusion and spatial segregation -Dissimilarity Index, Entropy Index;
- 3.3 Spatial segregations and caste, religion and gender; citadel, enclave, ghettos and outcaste ghettos;
- 3.4 Policies and plans to address the segregations and exclusions

Unit 4 : Urban Mobilities

(15 Hours)

- 4.1 Residential mobilities and neighbourhood change
- 4.2 Household mobilities; determinants of residential mobilities
- 4.3 Migrants and formations of slums
- 4.4 Urban renewal and gentrifications

Suggested Reading Materials

- 1 Banerjee-Guha, S. (2004): *Space, Society and Geography*, Rawat, New Delhi.
- 2 Clemente, A., Lindstrom, D. and Stobart, J. (2023): *Micro-geographies of the Western City, c. 1750-1900*, Routledge, New York.
- 3 Horton, J. and Kraftl, P. (2013): *Cultural Geographies: An Introduction*, Routledge, New York.
- 4 Judge, P.S. (2014): *mapping Social Exclusion in India*, Cambridge University Press, Cambridge.
- 5 Knox, P. and Pinch, S. (2006): *Urban Social Geography: An Introduction (Fifth Edition)*, Pearson, Prentice Hall, London.
- 6 Lefebvre, H. (1991): *The Production of Space*, Wiley Blackwell, Oxford.
- 7 Lefebvre, H. (2003) : *The Urban Revolution*, University of Minnesota Press, Minneapolis.
- 8 Michael, P. (2009) : *Urban Geography: A Global Perspective*, Routledge, New York.
- 9 Sattar, S. (2018): *Social Exclusion and Muslims of Kolkata*. In Shaban, A. (ed.) *Lives of Muslims in India*. Routledge, New Delhi/ London.
- 10 Shaban, A., Aboli, Z. (2021). *Socio-spatial Segregation and Exclusion in Mumbai*. In: van Ham, M., Tammaru, T., Ubarevičienė, R., Janssen, H. (eds) *Urban Socio-Economic Segregation and Income Inequality*. The Urban Book Series. Springer, Cham.
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- 12 Sidhwani, P. (2015): *Spatial Inequalities in Big Indian Cities*, *Economic & Political Weekly*, Vol 1. No.22: pp 55- 62.
- 13 Singh, R.P.B. (2016). *Urban Heritage and Planning in India: A Study of Banaras*. In: Dutt, A., Noble, A., Costa, F., Thakur, R., Thakur, S. (eds) *Spatial Diversity and Dynamics in Resources and Urban Development*. Springer, Dordrecht.
- 14 Smith, N (1996): *The new urban frontier: Gentrification and the Revanchist City*, Routledge, London.
- 15 Soja, E. (1989): *Postmodern Geographies: The Reassertion of Space in Critical Social Theory*, Verso, London.
- 16 Vithayathil, T. and Singh, G. (2012): *Spaces of Discrimination: Residential Segregation in Indian Cities*, *Economic & Political Weekly*, Vol 47. No. 37.
- 17 Zukin, S. (1996): *The Culture of Cities*, Wiley-Blackwell, Chichester.

Specialisation V: Geospatial Technologies

Title of the Course – Geo-Information Processing								
Year – 1			Semester - II					
Course Type	Course code	Credit Distribution		Credits	Allotted Hours	Allotted Marks		
DSE - 2	GEOG 51210	Theory	Practical	04	60	CIE	ESE	Total
		04	00			50	50	100

Course Objectives:

1. The main objective of the course is to learn how to generate information about the Earth from data stored and processed in Geographic Information Systems.

Course Outcomes:

At the end of this course, students must be able to:

CO 1. Explain the principles and use the vocabulary of GIS:

CO 2. Describe the nature of geographic phenomena and their representation in the context of geoinformatics;

CO 3. Outline the principal data models for spatial and non-spatial data used in GIS databases;

CO 4. Outline the main components of a GIS and their functions;

CO 5. Explain the relationship between spatial data and coordinate systems;

CO 6. Outline the main spatial data analysis functions;

CO 7. Outline the principal rules for cartographic visualization;

Unit 1 : Geographic Information System

(15 Hours)

1.1 Introduction to GIS:

The nature of GIS, The real world and representations of it

1.2 Geographic information and Spatial data types:

Models and representations of the real world, Computer representations of geographic information, Organizing and managing spatial data, The temporal dimension

1.3 Spatial Data Models: Vector and Raster, Vector representation (point, line, area and TIN)

Unit 2 : Database Management System

(15 Hours)

2.1 Database Management Systems (DBMS):

DBMS, The Relational Data Model, Querying a relational database

2.1 Spatial referencing and positioning:

Spatial referencing- Reference surfaces for mapping, Coordinate systems, Map projections, Coordinate transformations

2.3 Satellite-based positioning- Absolute positioning, Errors in absolute positioning, Relative positioning, Network positioning, Code versus phase measurements, Positioning technology, DGPS

Unit 3 : Spatial Data

(15 Hours)

3.1 Spatial data input and Data preparation:

Direct spatial data capture, Indirect spatial data capture, Other sources of spatial data, Data checks and repairs, combining data from multiple sources

3.2 Data quality and Point data transformation:

Accuracy and precision, Positional accuracy, Attribute accuracy, Temporal accuracy, Lineage, Completeness, Logical consistency; Interpolating discrete data, Interpolating continuous data

3.3 Data visualization:

GIS and maps, The visualization process, Visualization strategies: present and explore, The cartographic toolbox, Mapping of qualitative data, quantitative data, the terrain elevation data and map time series; Map setup, Map dissemination

Unit 4 : Spatial data analysis:

(15 Hours)

4.1 Retrieval, classification and measurement

4.2 Overlay functions- Vector overlay operators, Raster overlay operators, Overlays using a decision table

4.3 Neighbourhood functions- Proximity computations, Computation of diffusion, Flow computation, Raster based surface analysis

4.4 Network analysis

Suggested Reading Materials:

1. Agrawal, N.K.(2006), Essentials of GPS (Second Edition), Book Selection Centre, Hyderabad
2. Bernhardsen, Tor (2002): Geographical Information Systems: An Introduction, Third Edition, John Wiley & Sons, Inc., New York.
3. Burrough, Peter A and McDonnell, R.A. (1998): Principles of Geographical Information Systems, Oxford University Press, Mumbai.
4. Clarke, Keith C. (1998): Getting Started with Geographic Information Systems, Prentice-Hall Series in Geogl. Info. Science, Prentice-Hall, Inc. N.J.
5. Dykes, MacEachren & Kraak (eds.) (2005), Exploring Geovisualization
6. Heywood, I et al (2002): An Introduction to Geological Systems, Pearson Education Limited, New Delhi.
7. Huisman O. and R.A. de By (ed.), 2009: Principles of Geographic Information Systems - An introductory textbook, 4th ed., ITC, ISBN 90-6164-269-5
8. Kang-tsung Chang (2017) Introduction to Geographic Information Systems, McGraw Hill Education; 4th edition
9. Krygier & Wood (2005) Making maps: a visual guide to map design for GIS
10. Lillesand, Thomapson and Relph Kiffer (1994). Remote Sensing and Image Interpretations, John Wiley and Sons, Inc., New York.
11. MacEachren (1995), How map work
12. Menno-Jan Kraak and Ferjan Ormeling (2020) CARTOGRAPHY: Visualization of Geospatial Data, CRC press.
13. M. Anji Reddy (2012) Remote sensing and geographical information systems, 4th edition, B. S. Publications.
14. Michael N. DeMers (2009) Fundamentals of Geographic Information Systems, john wiley & sons.
15. Paul A. Longley, Michael F. Goodchild, David J. Maguire (2005) Geographic Information Systems and Science, 2nd Edition, john wiley & sons.
16. Parker, R, N. (2008),GIS and Spatial Analysis for the Social Sciences, Routledge, New York.
17. Pickles, John (2006), The Social Implications of geographic Information Systems, Rawat Publications, Jaipur.
18. Star, Jeffrey and John Estes (1996), Geographical Information Systems: An Introduction, Prentice-Hall, inc., N.J.
19. Shekar, S and Chawla, S, (2009), Spatial Databases: A Tour, Pearson Education, Delhi.
20. Slocum et. Al. (2009), Thematic Cartography and Geovisualization

Title of the Course – Applications of Remote Sensing and GIS in Geographic Studies								
Year – 1			Semester - II					
Course Type	Course code	Credit Distribution		Credits	Allotted Hours	Allotted Marks		
DSE - 2	GEOG 51211	Theory	Practical	04	60	CIE	ESE	Total
		04	00			50	50	100

Course Objectives:

1. To teach Students Remote Sensing and GIS in context of Geography
2. At the end of course students will understand the importance of Remote Sensing and GIS in Geography
3. Students will understand applications of Remote sensing and GIS in the solving of geographical problems.

Course Outcomes:

After completion of this course students will:

CO 1. Theoretical explanation based on case studies related to geographical problems will enhance the understanding of the students.

CO 2. Students will understand how GIS and Remote sensing tools can be used for Geographical studies.

Unit 1: Water Resources Applications

(15 Hours)

- 1.1 Remote Sensing of Water
- 1.2 Flood Mapping and Management
- 1.3 Rain water Harvesting and Water Quality Mapping
- 1.4 Drought Monitoring

Unit 2: Soil Applications

(15 Hours)

- 2.1 Remote Sensing of Geomorphology and Soil
- 2.2 Soil Moisture mapping
- 2.3 Soil Status Monitoring
- 2.4 Waterlogging and Saline soil areas

Unit 3: Forestry Applications

(15 Hours)

- 3.1 Remote Sensing of Vegetation
- 3.2 LULC- Forestry change detection
- 3.3 Forest resource Inventory
- 3.4 Forest Fire damage assessment

Unit 4: Urban Applications

(15 Hours)

- 4.1 Remote Sensing of Urban
- 4.2 Mapping and Updates of city/town maps
- 4.3 Urban Sprawl Monitoring – Town planning
- 4.4 Facility management – GIS database development

Suggested reading materials:

1. Avery, T.E., and G.L. Berlin, (1992) Fundamentals of Remote Sensing and Air photo Interpretation, New York: Macmillan.
2. Burrough P.A. and McDonnell R.A., (1998) Principles of Geographical Information Systems,.Oxford University Press. New York.
3. Campbell, J.B., (2002) Introduction to Remote Sensing, 3rd ed., New York: Guilford Press.
4. Chang, K, (2020) “Introduction to Geographical Systems”, 4th Edition, Tata McGraw-Hill.
5. DeMers, M.N., (2009)“Fundamentals of Geographical Information Systems”, 3rd Edition, John Wiley & Sons.
6. Elachi, C., (1987) Introduction to the Physics and Techniques of Remote Sensing, Hoboken, NJ: Wiley.
7. Ian Heywood Sarah, Cornelius and Steve Carver (2002) An Introduction to Geographical Information Systems. Pearson Education. New Delhi.
8. Irons, J.R., J.L. Dwyer, and J.A. Barsi, (2012) “The Next Landsat Satellite: The Landsat Data Continuity Mission,” Remote Sensing of Environment, vol. 122.
9. Jensen, J.R., and R.R. Jensen, (2013) Introductory Geographic Information Systems, Glenview, IL: Pearson Education, Inc.
10. Jensen, A R (2013) REMOTE SENSING OF THE ENVIRONMENT: AN EARTH RESOURCE PERSPECTIVE, 2nd Edition, Pearson Education, Inc.
11. Lillesand, T.M. and Kiefer, R.W., (2015) Remote Sensing and Image Interpretation 7th Edition. John Wiley and Sons, New York.

Annexure I
University of Mumbai
Two Year Degree Course of M.A. / M.Sc. (Geography)
As per Choice Based Credit System (CBCS)
(With effect from the academic year 2023-2024)
Examination pattern for Semester I and II

Semester I:

a) Theory Paper: 100 marks for each paper (Total theory papers 4)

i) Internal examination: Total marks 50 (in each theory paper)

ii) External examination: Total marks 50 (in each theory paper) Duration: 2 1/2 Hours

1) Total number of questions to be framed for theory paper in external examination is 7 of 10 marks each.

2) Out of total 7 questions, students are required to attempt **any Five** questions.

b) Practical Paper: 100 marks for one paper with four credits
50 marks for one paper with two credits

1) Out of total 100 marks in four credits practical, 80 marks for practical examination, 10 marks for journal writing and 10 marks for viva.

2) Out of total 50 marks in two credits practical, 40 marks for practical examination, 10 marks for journal writing and viva.

3) No of questions would correspond with number of major modules in the respective practical Course syllabus.

c) Marking system:

i) Total marks for theory: 4 Credits *4 theory papers =16 credits

ii) Total marks for practical: 6 credits for two practical papers

iii) Grand Total for Semester I is 22 credits

Semester II

a) Theory Paper: 100 marks for each paper (Total theory papers 3)

i) Internal examination: Total marks 50 (in each theory paper)

ii) External examination: Total marks 50 (in each theory paper) Duration: 2 1/2 Hours

1) Total number of questions to be framed for theory paper in external examination is 7 of 10 marks each.

2) Out of total 7 questions, students are required to attempt **any Five** questions.

b) Practical Paper: 100 marks for one paper with four credits
50 marks for one paper with two credits
100 Marks for On Job Training with four credits

1) Out of total 100 marks in four credits practical, 80 marks for practical examination, 10 marks for journal writing and 10 marks for viva.

2) Out of total 50 marks in two credits practical, 40 marks for practical examination, 10 marks for journal writing and viva.

3) The students are expected to complete on job training GEOG 510 to secure 4 credits. It is a mandatory component of first year M.A. / M.Sc. The evaluation of on job training will be done as per the guidelines provided by the University of Mumbai.

4) No of questions would correspond with number of major modules in the respective practical Course syllabus.

c) Marking system:

i) Total marks for theory: 4 Credits *3 theory papers =12 credits

ii) Total marks for practical: 6 credits for two practical

iii) 4 credits for on job training

iv) Grand Total for Semester II = 22 credits

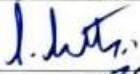



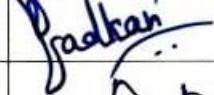

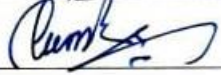

Total credits earned at the end M.A. / M.Sc.first yar (Semester I and Semester II) would be 44.

**Annexure II
Letter Grades and Grade Points**

Semester GPA / Program CGPA Semester / Program	% of Marks	Alpha – Sign / Letter Grade Result
9.00 – 10.00	90.0-100	O (Outstanding)
8.00 -< 9.00	80.0 -< 90.0	A+ (Excellent)
7.00 -< 8.00	70.0 -< 80.0	A (Very Good)
6.00 -< 7.00	60.0 -< 70.0	B+ (Good)
5.50 -< 6.00	55.0 -< 60.0	B (Above Average)
5.00 -< 5.50	50.0 -< 55.0	C (Average)
4.00 -< 5.00	40.0 -< 50.0	P (Pass)
Below 4.00	Below 40	F (Fail)
Ab (Absent)	-	Absent

M.A. / M.Sc. (Geography) (Semester I & II)

Team for creation of syllabus

Name	Name of Dept./Institute	Signature
Prof. Sanjukta Sattar	Department of Geography, University of Mumbai	
Dr. Ramesh Gavitt	Department of Geography, University of Mumbai	
Dr. Pandurang Choudhari	Department of Geography, University of Mumbai	
Dr. Aparna Phadke	Department of Geography, University of Mumbai	
Dr. Deepali Gadkari	Department of Geography, University of Mumbai	
Dr. Pravin Kokane	Department of Geography, University of Mumbai	
Ir. Devidas Tambe	Department of Geography, University of Mumbai	
Dr. Rajaram Patil	Department of Geography, Mahatma Phule A S C College Panvel	



Sign of HOD

Prof. Sanjukta Sattar

Department of Geography, University of
Mumbai



Sign of Dean

Prof. (Dr.) Anil Kumar Singh

Dean (Interdisciplinary Studies), University
of Mumbai

Appendix B

Justification for M.A. / M.Sc. (Geography)

1.	Necessity for starting the course:	In the National education policy 2020 there has been a major emphasis on multidisciplinary nature of various educational programs and learning experiences. Exposure to more vocational and practical oriented curriculum is another highlight of the policy. It is aimed at developing students into good professionals with contemporary skills required for the industry, academia, research and other walk of professional life. The M.A. and M.Sc. (Geography) has been designed by keeping the core philosophy of NEP. Five specialisations have been designed in the form of electives with the core specific mandatory courses. The students would earn 34 credits specifically in their specialisation out of total 88 credits for two years. The students will be pursuing their research project as well as their job training in their selected specialization. The five broader specialisations are 1. Physical Geography and Earth Systems. 2. Urban and Regional Planning and Development 3. Climate Change and Sustainability Studies 4. Human Geography and Human Ecology 5. Geospatial Technology. Total 22 credits have been planned to expose them to various geographical tools and techniques that would equip them with knowledge about various statistical techniques and huge repository of maps and GIS and remote sensing technologies. At the end of the two years master programme, the students are expected to develop major professional skills that is required in industries like GIS, tourism, Geostrategies, water resource management and so on. The mandatory component of the curriculum is planned to offer the students with various streams of knowledge that are cross disciplinary and interdisciplinary through the geographical (spatial) lens. Finally the curriculum is also designed to inculcate in them human values related to ethical behaviour and inclusiveness with respect to gender, language, nationality, caste and colour.
2.	Whether the UGC has recommended the course:	UGC has given guidelines for introduction of vocational elements in the regular curricula that would enhance the general output of the regular course that were otherwise run traditionally through an instructional learning method. (https://www.ugc.ac.in/oldpdf/xiplanpdf/revisedcareerorientedcourses.pdf). Universities are encouraged under NEP to run the diploma / certificate courses and with due approval of its governing councils/ statutory council wherever required (Ref: https://www.ugc.ac.in/faq.aspx). However, u/s 5(16) under Maharashtra Public Universities Act, 2016 (Mah. Act No. VI of 2017), Universities are empowered to offer course at various levels in choice based credit system for the various examinations leading to specific degrees, diplomas or certificates in a stand-alone format or joint format with other State or national or global universities.
3.	Whether all the courses have	The above degree programmes are recommended by the academic curriculum committee and further approved by the statutory bodies is to be introduced from the Academic Year 2023-2024.

	commenced from the academic year 2023-24:	
4.	The courses started by the University are self-financed, whether adequate number of eligible permanent faculties are available:	These degree programmes for M.A. (Geography) and M.Sc. (Geography) is the regular programme for the University Department in aided sections. However, affiliated colleges presently conducting specifically M.A. (Geography) need to comply with the norms laid down by the UGC and University regulatory authorities.
5.	To give details regarding the duration of the Course and is it possible to compress the course:	The duration of the M.A. (Geography) and M.Sc. (Geography) degree programmes is minimum 2 years (4 semesters) in the University Department of Geography. In affiliated colleges, the UG and PG programmes together would make 5 years (10 semesters) duration. In University departments, the exit point is after completion of one year (two semesters) where a post-graduate diploma will be offered to a student. It is not possible to compress the course as it has many components of vocational and theoretical learning.
6.	The intake capacity of each course and no. of admissions given in the current academic year:	The intake capacity will be as per the university guidelines. However, the existing intake capacity for M.Sc. (Geography) and M.A. (Geography) together was 75 for both the years making it 150 students per academic year.
7.	Opportunities of Employability / Employment available after undertaking these courses:	<ul style="list-style-type: none"> • GIS and remote sensing industry • Land surveying firms • Various strategic thinking tanks in geostrategies • Research assistant / Research Associate / Project head at the research institutes governmental and/or Non-governmental organizations at national and international level • Academic faculty at various educational institutions at various levels like secondary, higher-secondary, undergraduate, postgraduate and research

	<ul style="list-style-type: none">• Free lancing geography consultant• Urban and regional planning firms, organisations and government departments• Environmental consultants with specialization in environmental impact assessment, hydrology/ water resource management and seismicity with relevant expertise in Geographical data sets, GIS and remote sensing techniques• Sustainability consultants
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Sign of HOD

Prof. Sanjukta Sattar
Department of Geography, University of
Mumbai



Sign of Dean

Prof. (Dr.) Anil Kumar Singh
Dean (Interdisciplinary Studies), University
of Mumbai