Four Year Undergraduate Programme in Geography
under
National Education Policy, 2020

Curriculum



2023

(Modified 2026)

Department of Geography
Cotton University
Panbazar, Guwahati
Assam

Courses of the Four-Year Undergraduate programme in Geography, Cotton University

Semester	Course Code	Courses	Level
I	GPH24C101	Geomorphology: Forms and Processes	100
	GPH24M101	Geomorphology- Forms and Processes	100
	GPH25MDE101	Hill and Mountain Agriculture in Northeast India: Traditions, Continuity and Changes	100
	GPH23MDE102	Environmental concerns of contemporary times and institutional measures for mitigation	100
	GPH23SEC101	Global Navigation and Satellite Systems	100
II	GPH23C201	Population and Settlements Geography	100
	GPH23M201	Population and Settlements Geography	100
	GPH25MDE201	Sustainable Development	100
	GPH23SEC201	Measuring Dimensions of Human Development	100
	GPH25MDE202	Agriculture and Food Security in India	100
	GPH23VAC201	Indigenous Ecological Knowledge Systems: Native wisdom for a better future	100
	GPH23VAC202	Introduction to Ecology and Environment	100
III.	GPH23C301	Geography of India	200
	GPH23C302	Climatology	200
	GPH23M301	Geography of India,	200
	GPH23MDE301	Rural Development	200
	GPH23SEC003	Landscape Mapping	200
IV	GPH23C401	Soil Biogeography and Oceanography	200
	GPH23C402	Quantitative Methods in Geography	200
	GPH23C403	Cartographic Techniques – Maps and Diagram	200
	GPH25INT401	INTERNSHIP	
	GPH23M401	Climatology	200
	GPH23C501	Geographic Thought-I	300
	GPH25C502	Advanced Geomorphology	300
	GPH23C503	Cartographic Techniques, Surveying and Map Projection	300

V	GPH23C504	Political Geography	300
	GPH23M501	Soil Biogeography and Oceanography	200
VI	GPH23C601	Social and Cultural Geography	300
	GPH23C602	Environmental Geography	300
	GPH23C603	Remote sensing and Geographic Information System	300
	GPH23C604	Geography of Resources and Economic Activities	300
	GPH24M601	Cartographic Techniques – Maps and Diagram	200
VII	GPH24C701	Geographic Thought-II	400
	GPH25C702	Research Methodology	400
	GPH24C703	Political Economy of Regional Development	400
	GPH24C704	Southeast Asia	400
	GPH24DPW701	Dissertation/Project Work Part I	400 –4 credits
	GPH24M701	Geography of Health and Wellbeing,	300
VIII.	GPH24C801	Applied Statistics	400
	GPH24C802	Urban Studies	
	GPH24DPW801	Dissertation/Project work Part II	400- 8 credits
	GPH23M801	Geography of Resources and Economic Activities	300
	Students not opting dissertation shall opt for GPH24C803 (Northeast India) and GPH24C804A or GPH24C804B (one course will be taught in a particular session)		
	GPH24C803	Northeast India	400
	GPH24C804A	Regional Planning & Development	400
	GPH24C804B	Geography of Social Wellbeing	400

Semester I

Course Code: GPH24C101 & GPH24M101
Course Name: Geomorphology: Forms and Processes:
Credits: 4 =3+0+1 (L+T+P)
(Level 100)

This course will help the students to build up conceptual and theoretical foundation of geomorphology. The students will understand the functioning of the earth system; appreciate and explore how the natural operating factors shape the landform developments, and the ideas of landform at different environmental dimensions getting them acquainted with certain basic measures.

Specific learning outcome of this course are –

1. Understand the forms and process relationship and theories of geomorphology
2. Identify and understand the landforms in our own vicinity and the changes, if there are any, observed at the present time.
3. Understand the diversified landforms of the world

Unit	Content	No. of classes
Theory		
1	Geomorphology: Meaning, scope, and nature	3
2	Structure and composition of earth's interior, rocks and minerals, Concept of Isostasy and Eustasy	7
3	Geotectonic and Endogenic Geomorphic Processes: Earth Movements, Earthquakes and Volcanoes, mountain building theory Kober's and Holmes, Types of Folds and Faults andtheir formation mechanisms	15
4	Exogenic Geomorphic Processes: Weathering, Mass Wasting, Erosion, Transportation and Deposition	10
5	Landforms developed in Fluvial, Aeolian, Glacial, Karst, Coastal environment	10
Practical	1. Identification of landforms from topographical map 2. Profile drawing – serial, superimposed, projected and composite, 3. Measurement of slope and gradient 4. Altimetric frequency curve and histogram 5. Block diagram (one point perspective)	15

Suggested Readings:

- Ahmed, E., 1985: Geomorphology, Kalyani Publishers, New Delhi
- Bloom A. L., 2003: Geomorphology: A Systematic Analysis of Late Cenozoic Landforms, Prentice-Hall of India, New Delhi.

- Bridges E. M., 1990: World Geomorphology, Cambridge University Press, Cambridge.
- Dayal, P. (2nd Ed.) 1996: A Textbook of Geomorphology, Shukla Book Depot, Patna
- Kale V. S. and Gupta A., 2001: Introduction to Geomorphology, Orient Longman, Hyderabad.
- Khullar D.R. 2012: Physical Geography, Kalyani Publishers, New Delhi
- Monkhouse, F. J., 2009: Principles of Physical Geography, Platinum Publishers, Kolkata
- Singh, R. L. and Singh, R. P. B. 1999: Elements of Practical Geography, Kalyani Publishers
- Singh, Satyendra, 2007: Geomorphology, PrayagPustakBhawan, Allahabad.
- Strahler, A.N., 1960: Physical Geography, John Wiley & Sons, New York, London
- Thornberry, W.D., 1968: Principles of Geomorphology, Wiley Eastern Reprint.
- Waugh, D. 2002: An Introduction to Physical Geography, Nelson Thornes, U.K.

Semester I
Multi-Disciplinary Elective
Course Code: GPH25MDE101
Course Name: Hill and Mountain Agriculture in Northeast India: Traditions, Continuity and Changes
Credits: 3 = 2+1+0 (L+T+P)

Unit	Contents	No of lectures
1	Introductive to Landscape ecology; physical landscape of NE India and crop suitability	3
2	Hill agriculture practices of NE India – Jhum, Terrace, Wet-paddy; crops of northeast India, area and production	4
3.	Community practices around hill agriculture, reflection on Traditional Ecological Knowledge; traditional use and conservation approach on rainwater, soil conservations; traditional institutions on agriculture	8
4	Debates on sustainability of hill agriculture systems; challenges and continuity	4
5	Paradigm shift; new adoptions in farming practices and plantations – the state and the market	4
6.	Institutions for development of hill and mountain agriculture in India; review of policies, programme and budget/resources for sustainability	5
7.	Festivals around traditional agriculture practices – development of agro-eco tourism	2

Suggested Readings:

- Annonymous. Tillage and Interculture Management/ Farm Implements. In Inventory of Indigenous Technicla Knowledge in Agriculture Document 1; Document 2; Document 3; Publ: ICAR New Delhi.
- Bhatt, B. P.; Jat, M.L.; Arunachalam, A., Pattanayak, A. and Prakash, N. (2019). Roadmap for Agricultural Development in North-Eastern Hill(NEH) Region, India. Policy Brief, Published by Indian Council of Agricultural Research, New Delhi.
- Choudhary, S.L.; Sharma, G.S. and Nene, Y.L. (2000) Ancient and Medieval History of Indian Agriculture and its relevance to Sustainable Agriculture in the 21st Century. Proceedings of the summer school held from 28th May to 17th June 1999, Rajasthan College of Agriculture, Udaipur, India.
- Chandel, S. R. S. A Handbook of Agricultural Statistics. Publ: Impect Publishers.
- Dakshinkar, N. P. and Singh, M. (2022). Draught Animal Power and its relevance to Indian Agriculture, In Bhumi Suposhan, Akshay Krishi Parivar, pp. 80-87.
- Kalita, D. C. (2012). Sustainability and economic development in Hill Agriculture, New Delhi Biotech Books.
- Prakash, N. (2010). Sustainable Hill Agriculture, New Delhi Today and Tomorrow Printers and Publishers.
- Peshwe D. R.; Singh, R. K.; Deshmukh, K.A. and Chopra, S. (2018). Advances and Research in Agriculture Tools. Publ:MMEPublishig House, Nagpur.
- Rangaswamy, R. (2020). A textbook of Agricultural Statistics. Publ: New Age International Pvt. Ltd.
- Rao, G. N. (2018). Statistics for Agricultural Sciences. Publ: B.S. Publications.
- Ryszkowski, L. (2002). Landscape Ecology in Agroecosystems Management, Boca Raton CRC Press.
- Singh Jhina, P. (1962). Agriculture in the Hill Regions of the North India. New Delhi Directorate of Extension.
- Singh R.; Naik, D. and Feroze, S. M. (2014). Agri-Buisness potentials in India: Experience from Hill States. EBH Publishers India 136, M.L. Nehru Road, Pan Bazzar, Guwahati- 781001.
- Singh, R., Yumnam, A.; Roy, A. and Choudhury, A. (2018). Agriculture development: Technical and policy options. Biotech Books 4762-63/23 Ansari Road, Darya Ganj, New Delhi, 110002.
- Singh, P. K. (2000). Watershed Management: Design and Practices. E-media Publications, Udaipur.
- Singh, R.V. (2000). Watershed Planning and Management. Yash Publishing House, Bikaner.
- Sadhale, N. (2007). Water harvesting and conservation in ancient agricultural text. *In.* Nene YL. Ed. Glimpses of the Agricultural Heritage of India. Asian Agri-History Foundation. Pp. 414-424.
- Singh, H. and Kavia Z.D. (2007). Traditional Rainwater Harvesting Methods of Indian Thar Desert. *In.* Nene YL. Ed. Glimpses of the Agricultural Heritage of India. Asian Agri-History Foundation. Pp. 432-440.

Semester I
Course Code: GPH23MDE102
Course Name: Environmental concerns of contemporary times and institutional measures for mitigation
Credits 3: 3+0+0 (L+T+P)

This course introduces the students to certain environmental concerns of contemporary times, namely, global warming, climate change and desertification. Along with the concerns people across the developing and developed countries as well, are prone to several forms of tectonic, atmospheric, and geomorphic hazards. Mitigation measures are pivotal, and in this context, it is important to understand how the state and non-state institutions under the domain of environmental laws respond at local and global contexts, understand the association between environment and development towards ensuring sustainability of the earth.

After the completion of the course, the student will be able to

1. Understand concepts and critical problems related environmental concerns debated and discussed in contemporary times
2. Understand landscape with vulnerabilities.
3. Learn approaches and techniques for environmental impact assessment.
4. Understand laws and policies related to environmental regulations.

Unit	Content	No. of lectures
1	Environmental concerns - global warming, climate change, ozone depletion, acid rain, desertification	6
2	Hazards- definition and types, geographic distribution of natural hazards; hazard perception; hazard analysis; disaster- definition and types; disastrous effects of natural hazards; concept of risk and vulnerability – dimensions and analysis	8
3	Environmental laws- international and national	4
4	Response to disasters- community, voluntary organisation, and state organizations - national and international	5
5	Disaster management – Principles and stages of disaster management	4
6	Impact of and response to disasters - Case studies of tectonic, atmospheric and geomorphic hazards in developed and developing countries.	10
7	Environment and development, Concept of sustainable development, environment impact assessment	8

Suggested Readings:

- Bishop V. 2001: *Hazards and Responses*, (2nd edition) Collins, London
- Chandna R. C. 2003: *Environmental Geography*, Kalyani Publishers, New Delhi
- Frampton C., Hardwick and McNaught, 1999: *Causes, Consequences and Management of Disasters*, Hodder and Stoughton, London

- Frank W. L. 1986: *The Violent Earth*, Croom Helm, London
- Goel, S. L. 2001: *Encyclopaedia of Disaster Management* Vol. 1, 2 and 3, Deep and Deep Publications, New Delhi
- Kapur, A., 2010: *Vulnerable India: A Geographical Study of Disasters*, Sage Publication, New Delhi
- Keith S., 2002: *Environmental Hazards: Assessing Risk and Reducing Disaster*, Routledge, London
- Keller E. A. and Blodgett R. H., 2006: *Natural Hazards: Earth's Processes as Hazards, Disasters and Catastrophe*, Prentice Hall, New Jersey
- Pine John C. 2015: *Hazard Analysis, Reducing the Impact of Disasters* (2nd edition), CRC Press, Boca Raton, London, New York
- Saxena H. M. 1999: *Environmental Geography*, Rawat Publications, Jaipur and New Delhi
- Singh R. B. (ed) 2006: *Natural Hazards and Disaster Management: Vulnerability and Mitigation,* Rawat Publications, New Delhi
- Singh S 2014: *Environmental Geography*, Pravalika Publications, Allahabad

Semester I

Skill Enhancement Course I

Course Code: GPH23SEC101
Course Name: Global Navigation Satellite System (GNSS) and its application
Credits: 3= 2+0+1 (L+T+P))

The aim of this course is to introduce the principles of the Global Navigation Satellite Systems (GNSS), Satellite Positioning, GNSS Signal Structures and to demonstrate its applications to various aspects of location-based services and geospatial sciences.

After the completion of the course, the students will be able to

1. Understand fundamental theory and applications of radio navigation with the multi-GNSS.
2. Develop understanding of satellite orbit theory, GNSS signal structure, point positioning with pseudorange, real-time kinematic positioning with carrier phase, dilution of precision and atmospheric effect on GNSS signals.
3. Application of GNSS, field survey and mapping

Unit	Content	No. Of lectures
1	1. Introduction to Global Navigation Satellite System (GNSS) 2. Segments of GNSS 3. Working principle 4. Coverage of GNSS: I. Global coverage system a.GPS (USA) II. Local/ Regional coverage system (RNSS) a. IRNSS (India) III. Satellite Based Augmentation System (SBAS) a. GAGAN (India) 5. Application of GNSS (any one)	15
2	1. Introduction to the GPS instrument 2. Field Survey i. Point ii. Line iii. Area 3. Introduction to GPS software (Mapsource& DNR Garmin) 4. Data generation and transfer 5. Map layout (Point, line, and area)	15

Suggested Readings:

- Curtis, H., 2000: ***The GPS Accuracy Improvement Initiative***, GPS World, June, 2000.
- Gopi, S., 2005: ***Global Positioning System Principles and Applications***, Tata McGraw Hill, New Delhi.

Semester II

Course Code: GPH23C201 & GPH23M201

Course Name: Population and Settlements Geography

Credits 4= 3+1+0 (L+T+P)

The objective of the course is to familiarize the students with the data sources, particularly population census, Sample Registration System (SRS) and National Family and Health Survey (NFHS) to study population and settlements. The course aims to introduce the students to the nature and scope and fundaments of population and settlement studies in geography, and the current population and settlement issues in India.

The following learning outcomes will be achieved:

1. Exposing the students to the scope and nature of population and settlement geography
2. Familiarize the students with the fundamentals of population and settlement studies in geography

3. Familiarize the students with the current population and settlement issues in India.
4. Exposing the students with the data sources to study population and settlements

Unit	Content	Number of lectures
1	Definition, nature and scope of Population Geography; development of population geography. Sources and nature of population data (Census, SRS, and NFHS)	10
2	Population dynamics: fertility, mortality, and migration- basic measures: World population distribution, growth and trend; demographic transition theory	10
3	Age-sex structure of population:population pyramids; trends of dependency ratio, problems relating to ageing population	5
4	Definition, nature, and scope of Settlement Geography: rural, urban and peri-urban settlement	5
5	Rural settlements: origin and growth, types, pattern and characteristics of rural settlements, hill settlements – case studies from Northeast India. Urban settlements: origin, growth, and classifications; Concept of city, metropolis; megalopolis, conurbation; Census classifications of towns and cities of India; trend and pattern of urbanisation	10
6	Concepts of urban fringe, urban sprawl; rural-urban dichotomy and continuum	5

Suggested Readings:

- Barrett H. R., 1995: Population Geography, Oliver and Boyd.
- Bhende A. and Kanitkar T., 2000: Principles of Population Studies, Himalaya Publishing House.
- Chandna R. C. and Sidhu M. S., 1980: An Introduction to Population Geography, Kalyani Publishers.
- Clarke J. I., 1965: Population Geography, Pergamon Press, Oxford.
- Jones H. R., 1990: Population Geography, Sage.
- Jones, H. R., 2000: Population Geography, 3 ed. Paul Chapman, London.
- Lutz W., Warren C. S. and Scherbov S., 2004: The End of the World Population Growth in the 21st Century, Earthscan
- Newbold K. B., 2009: Population Geography: Tools and Issues, Rowman and Littlefield Publishers.
- Pacione M., 1986: Population Geography: Progress and Prospect, Taylor and Francis.
- Peters G. L. and Larkin R. P., 1979: Population Geography – Problems, Concepts and Prospects, Kendall Hunt Publication Co.
- Chisholm M., 2007: Rural Settlement and Land Use, Transaction Publishers.

- Daniel, P. 2002: Geography of Settlement, RawatPublications, Jaipur & New Delhi.
- Ghosh, Santwana 1999: A Geography of Settlements, Orient Longman, Kolkata.
- Kalia Ravi, 1999: Chandigarh: The Making of Indian City, Oxford University Press.
- Kaplan D. H., Wheeler J. O. and Holloway S. R., 2008: Urban Geography, John Wiley.
- Krishan G., 1999: Inner Spaces – Outer Spaces of a Planned City: A Thematic Atlas of Chandigarh, Celebrating Chandigarh.
- Ramachandran R., 1989: Urbanisation and Urban Systems of India, Oxford University Press.
- Ramachandran, R., 1992: The Study of Urbanisation, Oxford University Press, Delhi.
- Singh R. Y., 1994: The Geography of Settlement, Rawat Publication, New Delhi.
- Misra, R. P. &Misra, K. eds. 1998: Million Cities of India, Sustainable Development Foundation, New Delhi

Semester II
Multidisciplinary Elective
Course Code: GPH25MDE201
Course Name: Sustainable Development
Credit 3=2+1+0 (L+T+P)

This course introduces the students on the defining role of the concept and approaches of sustainable development in contemporary world taking into account of all-inclusive outcome indicators of development. The development indicators and wellbeing aspects are also considered from rights-based perspective. The course along with emphasizing and adoption of the sustainable approaches in all economic sectors, considers significance of policies adopted at global level, finance, and governance towards achieving the goals.

Specific learning outcome of the course are
1. The students will acquire ability to understand significance of the concept and its defining role.
2. Understand the policies and programme of the Governments in ameliorating the levels of poverty and inequality in contemporary world.
3. Identify critical issues related to environment, development, climate change, policy making and implementation.
4. Shall get acquainted with data base on development aspects.

Units	Contents	No. of lecture
1	Sustainable Development: Definition, concept, components and historical development, proposal for SDGs at Rio+20	4
2	Indicators and measurements of Sustainable Development Goals	6
3	Sustainable development policies and programmes; Relating aspects of development to SDGs: Education, Health; the challenges of universal health and education coverage and zero poverty.	12
4	Reaching the Goals: Principles of Good governance, financing sustainable development; National Action Plan on Climate Change, India's efforts to achieve net zero	8

Suggested Readings:

- Agyeman, Julian, Robert D. Bullard and Bob Evans (Eds.) (2003) Just Sustainabilities: Development in an Unequal World. London: Earthscan. (Introduction and conclusion.).
- Ayers, Jessica and David Dodman (2010) "Climate change adaptation and development I: the state of the debate". Progress in Development Studies 10 (2): 161-168.
- Baker, Susan (2006) Sustainable Development. Milton Park, Abingdon, Oxon; New York, NY: Routledge. (Chapter 2, "The concept of sustainable development").
- Bharucha, Erach (2025): Environmental Studies for Undergraduate Courses, UGC, 4th Edition.
- Chandana, R C (2006): Environmental Geography, Kalyani Publishers
- Martínez-Alier, Joan et al (2010) "Sustainable de-growth: Mapping the context, criticisms and future prospects of an emergent paradigm" Ecological Economics 69: 1741-1747.
- Osorio, Leonardo et al (2005) "Debates on sustainable development: towards a holistic view of reality". Environment, Development and Sustainability 7: 501-518.
- Singh, R.B. (Eds.) (2001) Urban Sustainability in the Context of Global Change, Science Pub., Inc.,Enfield (NH), USA and Oxford & IBH Pub., New Delhi.
- United Nations (2022) Financing for Sustainable Development, Report of the Inter-Agency Task Force on Financing for Development
- UNEP, An Introduction to Clean Development Mechanism

Semester II
Course Code: GPH25MDE202

Course Name: Agriculture and Food Security in India

Credits 3: 3+0+1 (L+T+P)

This course provides an understanding of the agriculture sector of India and its region and the approaches of the State for development in recent times. The approaches of the State in supporting production and marketing of the crops are considered critical in sustaining the agriculture sector, and to ensure food and nutritional security in the country.

The specific learning outcome of this course will be –

1. Understand the state of development of the agriculture sector and variations shaped by the regulatory measures in contemporary times in India.
2. Get acquainted with the policies and programmes on development of agriculture sector in India
3. Understand, and use a diversified set of secondary data on agriculture sector
4. Relate certain indicators on wellbeing and crises of the society and economy of India, outcome of developments in the agriculture sector.

Units	Contents	No of Lecture
I	Understanding the centrality of agriculture in India's development process. Developments, and structural changes (contribution to GDP and workforce) in the agriculture sector of India and Northeast India.	2
II	Developments in contemporary context; land use, cropping pattern, input intensity; and outcomes on production and yield; prices and marketing of agriculture produces	5
III	Agriculture policies and programmes: Technology, infrastructure, and institutions; agro-climatic regions and planning, irrigation, and watershed development	5
IV	Resources for agriculture development: Agriculture credits, agriculture budgets; subsidy issues- fertilizer and input subsidies	4
V	Agriculture wages and employment in India, regional variations, regulations, and wages; feminization of agriculture; gender issues in agriculture	5
VI	Crisis in India's agriculture: Regional variations in diversity and disparities; constraints to the growth of agriculture in India, Northeast India; the factors leading to the crisis.	3
VII	Food Security at national and households; Poverty, Hunger, Food Rights, Entitlements and Nutrition security	3

VIII	Food policy and the state; food market interventions; Agricultural price policy and food security, effects of price policy (MSP), Food subsidies, PDS and food security	4

Reference:

- PRS Legislative Research (2025) Demand for Grants 2025-26 Analysis Agriculture and Farmers Welfare; Institute for Policy Research, New Delhi

- Annual Reports (recent volumes), Ministry of Agriculture and Farners; Welfare, Government of India

- Agriculture Wages in India (recent volumes), Ministry of Agriculture and Farners; Welfare, Government of India

- Economic Surveys, (recent volumes), Ministry of Finance, Department of Economic Affairs, Government of India

- Arora V P S (2013), Agricultural Policies in India: Retrospect and Prospect, Agricultural Economics Research Review Vol. 26 (No.2) July-December 2013 pp 135-157

- The National Food Security Act, 2013, Ministry of Law and Justice, Government of India

- Prakash Shetty (2015) From food security to food and nutrition security: role of agriculture and farming systems for nutrition Current Science, Vol. 109, No. 3, 10 August, pp. 456-461

- *Additional Readings are to be provided after every class lecture*

Semester II
Skill Enhancement Course II
Course Code: GPH23SEC201
Course Name: Understanding and Measuring the Dimensions of Human Development
Credits: 3= 1+0 +2 (L+T+P)

The UNDP justifies the importance of having Human Development Index for countries of the world, states of a country, and districts of a state. The measure reflects a country's overall achievement in social and economic dimensions; reflected by certain inclusive outcomes indicators of life expectancy, level of education attainment and standard of living. In addition to the HDI, the UNDP has gone for several other indices to incorporate levels of income inequality, gender inequality and multiple deprivations of certain basics necessities at household level.

This course will help the students

1. Understand the concepts and measures of HDI, IHDI, GDI, GII and MDPI
2. Ability to collect and extract data and frame the relevant indicators and indices
3. Analyse and Evaluate the realities as reflected by the data.

Unit		Lectures	Tutorial and hands on exercise
I	Dimensions of Human Development to UNDP framework; Rationality, Data, Methodology and Measurement	2	6
II	Inequality adjusted human development index; measuring the development outcomes if there is no inequality.	2	4
III	Gender Development Index; understanding the gender gaps in human development.	1	4
IV	Gender Inequality Index; understanding gender based disadvantages; and the measure	1	4
V	Multi-dimensional Poverty Index; importance of having MDPI and the measure	2	6

Suggested Readings:

- Human Development Reports and Technical Notes: UNDP -Recent years
- Sabina Alkire, James Foster et al (2015) Multidimensional Poverty Measurement and Analysis, OUP.

Semester II
Value Added Course – Domain of Understanding India
Semester II
Course Code: GPH23VAC201
Course Name: Indigenous Ecological Knowledge Systems: Native wisdom for a better future
Credit: 2=1+ 1+ 0 (L+T+P)

Course Objective: To gain exposure to Indigenous Knowledge that is acquired through direct contact and experiences with nature and accumulated through generations. It incorporates beliefs and practices of a community that gives identity to the community.

CO1: Identify Indigenous Knowledge in their neighbourhood, region, state and country, locate the various values and practices associated with it and those for whom this knowledge is valuable.

CO2: Understand significance of Indigenous Ecological Knowledge in Modern Scientific Endeavour

Unit	Content	No of Classes
1	Concept, component and significance of Indigenous Knowledge	3
2	Indigenous Knowledge of Ecosystems	1
3	Indigenous knowledge towards nature conservation and resource management – forest, soil, water, wildlife etc.	4
4	Indigenous knowledge in natural hazard management	2
5	Ethics, values and cultural identity of the communities	2
6	Indigenous knowledge and modern scientific knowledge	3

Reading List

1. Bhagawati, K, Shukla, K K, Sen A, Bhagawati R (2016): Science and Indigenous Traditional Knowledge: Approaches of Galo/Adi Tribes, CreateSpace Independent Pub
2. Gosai K, Arunachalam A, Dutta, B K, GV P Kumar (2009): Indigenous knowledge of soil fertility management in the humid tropics of Arunachal Pradesh, Indian Journal of Traditional Knowledge, vol 10(3)
3. Inglish, Julian T, ed (1993): Traditional Ecological Knowledge: Concepts and Cases, International Development Research Centre
4. Lemi, T (2019): The Role of Traditional Ecological Knowledge (TEK) for Climate Change Adaptation, International Journal of Environmental Sciences and Natural Resources, vol 18, ISSN 2572-1119
5. Majumder, Satarupa D (2019): Indigenous Knowledge Systems towards a Holistic Inclusive Conservation, Manohar Publishers, Delhi
6. Mishra, S. Behera S K. and Bhui S ed (2022): Indigenous Knowledge System, Traditions and Transformations, Mittal Publications
7. Nauityal S and Goswami, M (2022): Role of traditional ecological knowledge on field margin vegetation in sustainable development: A study in rural-urban interface of Bengaluru, Trees, Forests and People, https://doi.org/10.1016/j.tip.2022.100207
8. Rai, S C (2007): Traditional Ecological Knowledge and Community-based Natural Resource Management in Northeast India, Journal of Mountain Science, vol 4 No 3

Semester II
Value Added Course – Domain Environment
Course Code: GPH23VAC202
Course Name: Introduction to Ecology and Environment
Credits: 2 = 1+1+0 (L+T+P)

Objectives: The course gives a general overview of the interplay between environment, culture, and society and how it changes across time and space. Students will learn about various historical, social and geographical perspectives on human-nature relationships in this course.

Course Outcomes: After completion of the course, a student shall be able to,

1. to integrate different scientific perspectives into a holistic understanding of the relationship between humans and the environment,
2. to analyze the differences between natural, socio-cultural and political aspects of the environment, and
3. to demonstrate an understanding of the human dimensions of environmental and resource management.

Unit	Contents	No. of Lectures
1	Theorizing Human-Nature relationship: Environmental Determinism, Possibilism, Environmentalism	3
2	Understanding Human Ecology: Biological and Socio-Cultural Dimensions of Human Ecology, Introduction to Cultural Ecology	4
3	Ecosystem Services, drivers of change in ecosystem services; Ecosystems and Human Wellbeing	3
4	Political Theory of Nature: Production of Nature, Political Ecology – Conservation and Control, Sustainability	5

Suggested Readings:

- Braun, B. (2008). Theorizing the nature-society divide. *The SAGE Handbook of Political Geography. Los Angeles, CA: SAGE*, 189-204.
- Gadgil, M., & Guha, R. (1993). This fissured land: an ecological history of India. Univ of California Press.
- Guha, R., & Alier, J. M. (2013). Varieties of environmentalism: essays North and South. Routledge.
- Guha, R. (ed.) (2018). Social ecology. Delhi: Oxford University Press
- Millennium ecosystem assessment, M. E. A. (2005). Ecosystems and human well-being (Vol. 5, p. 563). Washington, DC: Island press.
- Richerson, P. J., Mulder, M. B., & Vila, B. (1996). What is Human Ecology? *Principles of human ecology*. Simon & Schuster Custom Pub.
- Robbins, P. (2004). Cultural ecology. *A companion to cultural geography*, 180-193.
- Robbins, P. (2019). *Political ecology: A critical introduction*. John Wiley & Sons.

- Sahlins, M. D. (1963). *Culture and environment: The study of cultural ecology*. Voice of America, US Information Agency.
- Steiner, F., & Steiner, F. (2016). Fundamental Principles of Human Ecology. *Human Ecology: How Nature and Culture Shape Our World*, 19-37.

Semester III

Course Code: GPH 23C 301
Course Name: Geography of India
Credit 4= 3+0+1 (L+T+P)
(Level -200)

This course will help gain a wide-ranging idea on India from geographical perspective. The paper is aimed to familiarize the students with the physical and human aspects of India and develop a regional perspective. The course is designed to broaden the understanding of various natural and cultural factors in India to help appreciate the interaction between the two sets of factors over space.

The following learning outcomes will be achieved:

1. Understand the physical profile of the country, relating the profiles to basic concepts and theories,
2. The agro-industrial and natural resources ecosystem structure of the country
3. Perceptions and approach of society and state towards resource use
4. Identify certain critical problems on outcome of development programme,
5. Understand and use of certain spatial tools and techniques, use of data to measure development outcomes.
6. Public policy analysis

Course Content:

Unit	Contents	No. of lectures
1	Physical: physiography, soil, climate, drainage, vegetation	10
2	Population: growth and distribution	4
3	Economic Resources: mineral and power resource distribution and utilization (coal, iron ore, petroleum, natural gas; non-conventional energy – wind, solar, bio-energy, nuclear); Major crops paddy, wheat, maize, tea, horticulture – production and distributions; Industries and Industrial development with study of specific	14

	industries (large – iron and steel; medium- paper, textile; small and micro -handloom and handicraft, food processing) developments in information technology sector, Human resources – level and measurement of human development in the states of India	
4	Social: religion, language, tribes, race, ethnicity; diversities	6
5	Regionalisation of India: Socio-cultural (Sopher), Economic (Sengupta), Agro-climatic regions (planning commission)	6
6	Regional disparities in economic development – agriculture and industrial sectors	5

Suggested Readings:

- Ahmed, A. (1999): *Social Geography*, Rawat Publications. Jaipur
- Deshpande, C.S. (1992): *India: A Regional Interpretation*, ICSSR, New Delhi
- Hussain, M. (2014): *Geography of India,* Tata Mcgrow-Hill Education, New Delhi
- Khullar, D.R. (2011): *India: A comprehensive geography*, Kalyani Publishers, New Delhi
- Mandal, R.B. (Ed) (1990): *Patterns of Regional Geography- A International Perspective.*Vol3- Indian Perspective.
- Pathak, C.R. (2003): *Spatial structure and Process of Development in India. Regional Science Association*, Kalkata.
- Sharma, T.C. (2003*): India- Economic and Commercial Geography*, Vikas Publications, New Delhi
- Singh, J. and Dhillon, S.S. (2004): *Agricultural,* Tata Mcgraw-Hill Education, New Delhi
- Singh, Jagdish (2003): *India-A Comprehensive of Systematic Geography*, Gyanodaya Prakashan, Gorakhpur
- Singh, R.L. (1993): *India: A regional Geography*, UBS publishers Distributors, New Delhi
- Tirtha, R. (2002): *Geography of India*, Rawat Publications, Jaipur
- Tiwari, R.C. (2007): *Geography of India*. Prayak Pustak Bhawan, Allahabad

Semester III
Course Code: GPH23C302
Course Name: Climatology
Credits: 4=3+0+1 (L+T+P)

This paper introduces the students to the basic concepts associated with earth's atmosphere; elements of weather and factors influencing climates and disturbances in the world. The students will understand the functioning of the atmospheric system and analyze how the natural operating factors influencing the variations.

The specific learning outcomes of this course are –

1. Understanding the basic concept of climate and weather, their phenomenon and parameter
2. Relate the phenomena of weather and climate in different spatial contexts.
3. Identify, and relate certain critical phenomena occurred and discussed in contemporary times revealing the applied dimensions.

Unit	Contents	No. of lectures
1	Atmosphere: Structure and composition of Atmosphere	4
2	Heat and Temperature: Insolation, heat budget, vertical and horizontal distribution of temperature	4
3	Pressure and Winds: Atmospheric Pressure, Measurement of air pressure and wind, Distribution of pressure, Factors affecting pressure, Pressure belts; Atmospheric Circulation, Factors controlling winds, Types of Winds, Planetary wind system, Instruments for wind direction, speed and strengths, Jet Streams.	10
4	Humidity and Precipitation: Measurement of Atmospheric moisture, Types of Humidity, Factors affecting rate of Evaporation and distribution, Evapotranspiration, Forms of condensation, Types of clouds, stability and instability of air.	10
5	Air Masses and Fronts: Classification of Air Masses, Modifications. Fronts and their types. Cyclones and Anticyclones: Types of Cyclones, Temperate and Tropical Cyclones;	10
6	World Climatic Regions: Classification of Climate of the World, Koeppen's Climatic Classification.	4
7	Climate change and extreme climatic events	3
8	Practical: Graphs/ diagrams representing climatic data. 1. Weather map interpretation,	15

	2. Rainfall dispersion graphs, 3. Climographs (Taylor),4. Hythergraph 5. Star/ Wind rose diagram 6. Preparation and interpretation of maps showing the trend of onset and withdrawal/retreat of Monsoon in India/Northeast India	

Suggested Readings:

- Barry R. G. and Carleton A. M., 2001: *Synoptic and Dynamic Climatology*, Routledge, UK.
- Barry R. G. and Corley R. J., 1998: *Atmosphere, Weather and Climate,* Routledge, New York.
- Batten L. J., 1979: *Fundamentals of Meteorology*, Prentice-Hall Inc. Englewood Cliffs, New Jersey.
- Boucher K., 1975: *Global Climates*, Halstead Press, New York.
- Critchfield H. J., 1987: *General Climatology*, Prentice-Hall of India, New Delhi.
- Griffith, J.F.,1966: *Applied Climatology*, Oxford university Press
- Lal, D.S., 2002: *Climatology*, Chaitanya Publishing House, Allahabad
- Lutgens F. K., Tarbuck E. J. and Tasa D., 2009: *The Atmosphere: An Introduction to Meteorology*, Prentice-Hall, Englewood Cliffs, New Jersey.
- Oliver J. E. and Hidore J. J., 2002: *Climatology: An Atmospheric Science*, Pearson Education, New Delhi.
- Singh, S. 2007: *Climatology*, Sharada Pustak Bhawan, Allahabad.
- Thompson D. R. and Perry A. (eds.), 1997: *Applied Climatology: Principles and Practice,* Routledge, USA, and Canada.
- Trewartha G. T. and Horne L. H., 1980: *An Introduction to Climate*, McGraw-Hill.

Semester III
Course Code: GPH23M301
Course Name: Geography of India
Credits: 4=3+1+0 (L+T+P)
(Level -200)

This course will help gain a wide-ranging idea on India from geographical perspective. The paper is aimed to familiarize the students with the physical and human aspects of India and develop a regional perspective. The course is designed to broaden the understanding of various natural and cultural factors in India to help appreciate the interaction between the two sets of factors over space.

The following learning outcomes will be achieved:

7. Understand the physical profile of the country, relating the profiles to basic concepts and theories,
8. The agro-industrial and natural resources ecosystem structure of the country
9. Perceptions and approach of society and state towards resource use
10. Identify certain critical problems on outcome of development programme,
11. Understand and use of certain spatial tools and techniques, use of data to measure development outcomes.
12. Public policy analysis

Course Content:

Unit	Contents	No. of lectures
1	Physical: physiography, soil, climate, drainage, vegetation	10
2	Population: growth and distribution	4
3	Economic Resources: mineral and power resource distribution and utilization (coal, iron ore, petroleum, natural gas; non-conventional energy – wind, solar, bio-energy, nuclear); Major crops paddy, wheat, maize, tea, horticulture – production and distributions; Industries and Industrial development with study of specific industries (large – iron and steel; medium- paper, textile; small and micro -handloom and handicraft, food processing) developments in information technology sector, Human resources – level and measurement of human development in the states of India	14
4	Social: religion, language, tribes, race, ethnicity; diversities	6
5	Regionalisation of India: Socio-cultural (Sopher), Economic (Sengupta), Agro-climatic regions (planning commission)	6
6	Regional disparities in economic development – agriculture and industrial sectors	5

Suggested Readings:

- Ahmed, A. (1999): *Social Geography*, Rawat Publications. Jaipur
- Deshpande, C.S. (1992): *India: A Regional Interpretation*, ICSSR, New Delhi
- Hussain, M. (2014): *Geography of India,* Tata Mcgrow-Hill Education, New Delhi
- Khullar, D.R. (2011): *India: A comprehensive geography*, Kalyani Publishers, New Delhi
- Mandal, R.B. (Ed) (1990): *Patterns of Regional Geography- A International Perspective.*Vol3- Indian Perspective.
- Pathak, C.R. (2003): *Spatial structure and Process of Development in India. Regional Science Association*, Kalkata.
- Sharma, T.C. (2003*): India- Economic and Commercial Geography*, Vikas Publications, New Delhi

- Singh, J. and Dhillon, S.S. (2004): *Agricultural,* Tata Mcgraw-Hill Education, New Delhi
- Singh, Jagdish (2003): *India-A Comprehensive of Systematic Geography*, Gyanodaya Prakashan, Gorakhpur
- Singh, R.L. (1993): *India: A regional Geography*, UBS publishers Distributors, New Delhi
- Tirtha, R. (2002): *Geography of India*, Rawat Publications, Jaipur
- Tiwari, R.C. (2007): *Geography of India*. Prayak Pustak Bhawan, Allahabad

Semester III
Multidisciplinary Electives
Course Code: GPH23MDE301
Course Name: Rural Development
Credits: 3 = 2+1+0 (L+T+P)

This course is designed to make the students informed and understand the centrality of rural economic base and approaches for development. The course focuses on Gandhian approach of rural development, introduces the students the Panchayati raj systems on its functions, functionaries and fund, the agriculture and allied activities, and .cooperatives. The area based and target group approaches adopted in India for rural development are also discussed. It is also discussed that understanding on rural areas is complete if provisioning of basic services of health care and education system and the institutional provisioning of credits are ensured.

The learning outcome of the course are-

1 Understand the rural landscape and critical problems associated with development of rural areas of India
2. Understand policies and programs for development of rural areas
3. Learn approaches for rural development and adopting newer process for services in elementary education and primary health care.
3. Get introduced to a data base on development indicators in rural areas

Units	Content	No. Of lectures
1	Defining Development: Rural Sectors of the Economy; Agriculture and Allied Sectors, Seasonality and Need for Expanding Non-Farm Activities, Gandhian Approach of Rural Development.	**8**
2	Rural governance: Panchayati Raj System, co-operatives	**6**
3	Approaches for Rural Development in India: Programmes for rural development; Micro credits	**8**
4	Provision of Services – Physical and Socio-Economic Access to Elementary Education and Primary Health	10

Suggested Readings:

- Gilg A. W., 1985: *An Introduction to Rural Geography,* Edwin Arnold, London.
- Krishnamurthy, J. 2000: *Rural Development - Problems and Prospects,* Rawat Publs., Jaipur
- Lee D. A. and Chaudhri D. P. (eds.), 1983: *Rural Development and State*, Methuen, London.
- Misra R. P. and Sundaram, K. V. (eds.), 1979: *Rural Area Development: Perspectives andApproaches*, Sterling, New Delhi.
- Misra, R. P. (ed.), 1985: *Rural Development: Capitalist and Socialist Paths*, Vol. 1, Concept, New Delhi.
- Palione M., 1984: *Rural Geography*, Harper and Row, London.
- Ramachandran H. and Guimaraes J.P.C., 1991: *Integrated Rural Development in Asia – Leaningfrom Recent Experience,* Concept Publishing, New Delhi.
- Robb P. (ed.), 1983: *Rural South Asia: Linkages, Change and Development*, Curzon Press.
- UNAPDI 1986: *Local Level Planning and Rural Development: Alternative Strategies*. (United Nations Asian & Pacific Development Institute, Bangkok), Concept Publs. Co., New Delhi.
- Wanmali S., 1992: *Rural Infrastructure Settlement Systems and Development of the RegionalEconomy in South India*, International Food Policy Research Institute, Washington, D.C.
- Ministry of Panchayati Raj, A Roadmap for Panchayati Raj – 2011-17, Government of India.

Semester III
Skill Enhancement Course III
Course Code: GPH24SEC301
Course Name: Landscape Mapping
Credits: 3= 2+0+1 (L+T+P)

This course will help the students to build up theoretical and conceptual foundation on mapping, especially digital mapping. This course will enable learners how to compose maps from the web-based data. Also, students will be introduced to few leading software related to map making and GIS.

Course outcomes:
1. To understand the various purposes, roles and representation of map making
2. To gain and practice the use of mapping language in the creative map design process.
3. To gain and practice skills in modern cartographic design, representation and production in a GIS environment

Unit	Content	No. of lectures
1	Map- meaning, and significance and classifications of map, Thematic map - classification, map scale and map projections.	10

2	Remote Sensing, GPS and GIS in Map making.	12
3	Digital mapping: Introduction, Processes involved in Digital map making: Web Data sources, Data collection, Analysis and visualisation.	12
5	Mapping the Environment: Physical map, Attribute Map, Change Detection, Environment Monitoring, Disaster management, Resource mapping, Elevation Map	8
6	**Practical:** Creation of map Layout (point line and polygon features), Visual Image Interpretation, Mapping With Google Earth: Map Lay out , Elevation map	8

Suggested Readings:

- Burrough, P.A., and Mc Donnel, R.A.,1998: Principles of Geographical InformationSystems, Oxford University Press.
- Curran, Paul, J., 1985: Principles of Remote Sensing, Longman Group Ltd.
- Star, J. and Ester, J., 1990: Geographic Information System, Prentice-Hall.
- Liles and, T.M. and Kiefer, R.W., 1987: Remote Sensing and Image Interpretation, John
- Wiley.
- Hord, R. Michael., 1986: Remote Sensing: Methods and Applications, John Wiley.
- Krygier, J., & Wood, D., 2016: Making maps: a visual guide to map design for GIS. Guilford Publications.
- Maguire, D. J., Goodchild, M. and Rhind, D. J.,1990: Geographical Information Systems:
- Principles and Applications, Longman Science and Technology Publications. Robinson,
- H., et al., 1995: Elements of Cartography, John Wiley.
- Sabins, Floyd F., 1987: Remote Sensing Principles and Interpretation, W.H. Freeman andCompany, New York.

Semester IV

Course Code: GPH23C401
Course Name: Soil, Biogeography and Oceanography
Credits: 4=3+1+0 (L+T+P))
(Level 200)

This course introduces the basic concepts and features of associated with oceanography, soil, and biogeography. Students shall get acquainted with the physical features and environment of oceans, the movements and changes and outcomes observed in the forms of facilitation of economic activities as well as the calamities. Understanding on the biomes, people's living in different ecological settings and traditional ecological knowledge would offer an outlook to look at the world to ensure sustainability.

The specific learning outcomes are

1. Understand the basic concept and theories of oceanography, biogeography and soil studies, landscape, and spatial dimension of all components at global level,
2. Learn the ecosystems evolved around the ocean and soil,
3. Ability to relate human perceptions including development of traditional knowledge base in all forms of ecological settings.
4. Identification of emerging problems if any in spatial context and need of policy interventions.

Unit	**Content**	**No. Oflectures**
1	Definition and scope of oceanography, coral reefs and islands: conditions of growth, types of coral reefs	08
2	Ocean salinity, temperature, ocean deposits, bottom configuration of Indian, Atlantic and Pacific oceans; Tides, Waves, Ocean currents, Ocean- Atmosphere interactions - El Nino, La Nina; Marine resources and concerns for sustainability	11
3	Definition and scope of biogeography, biomes, ecology, and ecosystem – components, structure, types, ecotone, food chain and food web, energy flow, bio-geo chemical cycles, biodiversity hotspot and conservation	18
4	Factors and processes of soil formation, properties of soil,classification of soil, soil profile, soil catena, soil erosion and degradation; measures to check soil degradation	08

Suggested Readings:

- Anikouchine W. A. and Sternberg R. W., 1973*: The World Oceans: An Introduction to Oceanography*, Prentice-Hall.
- Garrison T., 1998: *Oceanography*, Wordsworth Company, Belmont.
- Gerald S., 1963: *General Oceanography: An Introduction,* John Willey & Sons, New York.

- Kershaw S., 2000: *Oceanography: An Earth Science Perspective*, Stanley Thornes, U. K.
- King C. A. M., 1962: *Oceanography for Geographers,* Edward Arnold.
- Pinet P. R., 2008: *Invitation to Oceanography* (Fifth Edition), Jones and Barlett Publishers, USA, UK, and Canada.
- Sharma R. C. and Vatal M., 1980: *Oceanography for Geographers,* Chaitanya Publishing House, Allahabad.
- Sverdrup K. A. and Armbrust, E. V., 2008: *An Introduction to the World Ocean*, McGraw Hill, Boston.
- Thurman H. V., 1996: *Essentials of Oceanography*, Prentice-Hall, New Jersey
- Bradshaw, M. J., 1979: *Earth and Living Planet*, ELBS, London.
- Bunting, B. T., 1967: *The Geography of Soil*, Hutchinson, London.
- Foth, H. D. and Turk, L. M. 1972: *Fundamentals of Soil Science*, John Wiley, New York.
- Govindarajan, S. V. and Gopala Rao, H. G., 1978: *Studies on Soils of India*, Vikas, New Delhi.
- Goudie, Andrew, 1981: *The Human Impact*, Basil Blackwell, Oxford.
- Huggett, R. J., 1988*: Fundamentals of Biogeography*. Routledge, London.
- Huggett, R. J., 1995: *Geoecology: An Evolutionary Approach*, Routledge, London.
- Hussain, M. (ed), 1994: *Biogeography (Part I&II),* Anmol Publications Pvt. Ltd., New Delhi.
- Newbiggin: *Plant and Animal Geography.*
- Pears, N., 1985: *Basic Biogeography*. 2nd Edition, Longman, London.
- Robinson, H., 1982: *Biogeography*, E.L.B.S., Mc Donald & Evans, London.
- Russell, E.W., 1973: *Soil Condition and Plant Growth*, Longman, London.
- Mc. Bride, M. B., 1999: *Environmental Chemistry of Soils*, Oxford University Press, New York
- Odum, E. P., 1971: *Fundamentals of Ecology,* W.B. Saunders, Philadelphia.
- Singh, S. 1991: *Environmental Geography*, Prayag Publications, Allahabad.
- Smith, R. L., 1977: *Ecology of Man- An Ecosystem Approach.*
- Spellberg, I. F. & Sawyer, J. W. D., 1999: *An Introduction to Applied Biogeography*, Cambridge University Press.
- World Resources, 2001: *People and Ecosystems*; World Resources Institute, Washington.

Semester IV

Course Code: GPH23C402
Course Name:Quantitative Methods in Geography
Credits: 4=3+0+1 (L+T+P)
(Level 200)

This course discusses significance of quantification, and quantitative/statistical methods in Geography. This course introduces the students to data sets and sources of data and various modes of analysis to explain geographical phenomena.

After the completion of the course, the students will be
1. Learn the basic concepts of statistics
2. Acquire ability to understand the nature of data used in geographical study and research
3. Apply appropriate technique to collect socio-economic data from the field.
4. Develop skill to process data for meaningful outcomes, represent and interpret the results.

Unit	Content	Lectures
1	Significance and need of quantification in geography; sources of geographic data, types of data – primary and secondary, discreate and continuous, spatial and non-spatial, scales of measurement, geographical data matrix	5
2	Descriptive statistics: measures of central tendency- mean, median, mode and their relationship	5
3	Positional measures- deciles, quartiles and percentiles of data; measures of dispersion – absolute and relative measures of dispersion, range, quartile deviation, mean deviation, standard deviation, coefficient of variation	12
4	Sampling- types and methods of sampling; sampling errors, confidence intervals, sample size estimation	10
5	Probability distribution- normal distribution, measures of skewness and kurtosis, z-score – meaning and use	5
6	Correlation analysis- types and methods of correlation, Spearman's rank correlation, Karl Pearson's product moment correlation, Kendall's method	8
7	Practical- Preparation of data matrix table, calculation of mean, median and mode of geographic data, locating positions of mean, median and mode graphically, standard deviation and coefficient of variation, preparation of variability maps (Assam/Northeast India) of rainfall and agricultural production; showing confidence intervals graphically;correlation analysis - Spearman, Pearson method	15

Suggested Readings:

- Alvi, Z. 1995: *Statistical Geography*, Rawat Publications, Jaipur and New Delhi
- Berry B.J.L and Marble D. F. (eds): *Spatial Analysis- A reader in Geography* Prentice Hall, Englewood Cliffs, N. J.
- Ebdon D. 1977: *Statistics in Geography: A practical Approach* (2nd edition 1991) Wiley
- FitzGerald, B. P. *et al* 1974: *Science in Geography Series,* Oxford University Press, London
- Gregory, S. 2014: *Statistical Methods and the Geographer,* Routledge
- Hammond R. and McCullagh P. S., 1978: *Quantitative Techniques in Geography*, Oxford University Press

- King L.J. 1969: *Statistical Analysis in Geography*, Prentice Hall
- Mahmood A., 1977: *Statistical Methods in Geographical Studies*, Concept
- Pal, S. K. 1998: *Statistics for Geoscientist*, Tata McGraw Hill, New Delhi
- Rogerson, P 2006: *Statistical Methods for Geography (*2nd Edition), Sage Publications, London, New Delhi

Semester IV

Course Code: GPH23C403
Course Name: Cartographic Techniques: Maps and Diagrams
Credits:4=3+0+1(L+T+P)
(Level 200)

The main objective of the course is to give the students an understanding of the various types of geographic data and different forms of data representation including maps, diagrams, and graphs. The course introduces the students to various components of maps and topographic sheets to analyse various aspects of the space. The course has a practical component where the adequate emphasis has been given on the applied aspects of the subject of emerging techniques of map-making. Keeping in mind the research-driven nature of the subject based on empirical data, this course introduces the spatial tools and techniques of interpreting topographic, weather, population, and economic data.

The following learning outcomes will be achieved

1. Exposing the students to the concepts, scope, and nature of cartographic information.
2. Familiarize students with diagrammatic data representation, enabling them to understand the meaning of information on relief, climatic, economic and population attributes and represent them.
3. Facilitate the students to learn map reading skills, students will develop cartography skills and learn skills of map-making.
4. Develop aptitude for acquiring the basic skills of processing and interpreting geographic data.

Unit	Contents	Class
1	Definition, nature, scope and development of cartography, impact of changing technology	5
2	Map elements, Map scale: classification of map scale, conversion of scale	5
3	Map: significance and classifications of map, map design and layout principle, map generalization. Thematic map – classification, challenges in thematic mapping; types of representation -chorochromatic, choropleth, isopleth, dot map, flow map, dissymmetric map, Quantitative thematic maps with proportional symbols	15

3	Diagrammatic Data Presentation – Dot, Line, Bar, Circle and Spheres to represent relief, climatic, population and economic data	15
4	Introduction to elements of topographical and weather maps	5
7	**Practical** Construction of scale: linear, comparative and vernier scale, computation of area using graphical method Mapping point features- qualitative and quantitative; line features-qualitative and quantitative Preparation of isopleths map using physical or environmental data, choropleth map using population, socio-economic data Quantitative thematic maps- simple dot map, proportional circle	15

Suggested Readings:

- Gupta K.K. and Tyagi, V. C., 1992: *Working with Map, Survey of India*, DST, New Delhi.
- Loxton J., 1980: *Practical Map Production*, John Wiley.
- Mishra R.P. and Ramesh, A., 1989: *Fundamentals of Cartography*, Concept, New Delhi.
- Monkhouse F. J. and Wilkinson H. R., 1973: *Maps and Diagrams*, Methuen, London.
- Rhind D. W. and Taylor D. R. F., (eds.), 1989: *Cartography: Past, Present and Future*, Elsevier, International Cartographic Association.
- Robinson A. H., 2009: *Elements of Cartography*, John Wiley and Sons, New York.
- Singh R. L. and Singh R. P. B., 1999: *Elements of Practical Geography*, Kalyani Publishers.
- Singh G. 2004: *Map Work and Practical Geography*, Vikas Publishing House Pvt. Ltd., Delhi,
- Tyner J. A., 2010: *Principles of Map Design*, The Guilford Press.

GPHINT401: INTERNSHIP

Semester IV
Course Code: GPH23M401
Course Name: Climatology
Credits:4 = 3+0+1(L+T+P)
(Level -200)

This paper introduces the students to the basic concepts associated with earth's atmosphere; elements of weather and factors influencing climates and disturbances in the world. The students will understand the functioning of the atmospheric system and analyze how the natural operating factors influencing the variations.

The specific learning outcomes of this course are –

4. Understanding the basic concept of climate and weather, their phenomenon and parameter
5. Relate the phenomena of weather and climate in different spatial contexts.
6. Identify, and relate certain critical phenomena occurred and discussed in contemporary times revealing the applied dimensions.

Unit	Contents	No. of lectures
1	Atmosphere: Structure and composition of Atmosphere	4
2	Heat and Temperature: Insolation, heat budget, vertical and horizontal distribution of temperature	4
3	Pressure and Winds: Atmospheric Pressure, Measurement of air pressure and wind, Distribution of pressure, Factors affecting pressure, Pressure belts; Atmospheric Circulation, Factors controlling winds, Types of Winds, Planetary wind system, Instruments for wind direction, speed and strengths, Jet Streams.	10
4	Humidity and Precipitation: Measurement of Atmospheric moisture, Types of Humidity, Factors affecting rate of Evaporation and distribution, Evapotranspiration, Forms of condensation, Types of clouds, stability and instability of air.	10
5	Air Masses and Fronts: Classification of Air Masses, Modifications. Fronts and their types. Cyclones and Anticyclones: Types of Cyclones, Temperate and Tropical Cyclones;	10
6	World Climatic Regions: Classification of Climate of the World, Koeppen's Climatic Classification.	4
7	Climate change and extreme climatic events	3
8	<u>Practical</u>: Graphs/ diagrams representing climatic data. 1. Weather map interpretation,	15

	2. Rainfall dispersion graphs, 3. Climographs (Taylor),4. Hythergraph 5. Star/ Wind rose diagram 6. Preparation and interpretation of maps showing the trend of onset and withdrawal/retreat of Monsoon in India/Northeast India	

Suggested Readings:

- Barry R. G. and Carleton A. M., 2001: *Synoptic and Dynamic Climatology*, Routledge, UK.
- Barry R. G. and Corley R. J., 1998: *Atmosphere, Weather and Climate,* Routledge, New York.
- Batten L. J., 1979: *Fundamentals of Meteorology*, Prentice-Hall Inc. Englewood Cliffs, New Jersey.
- Boucher K., 1975: *Global Climates*, Halstead Press, New York.
- Critchfield H. J., 1987: *General Climatology*, Prentice-Hall of India, New Delhi.
- Griffith, J.F.,1966: *Applied Climatology*, Oxford university Press
- Lal, D.S., 2002: *Climatology*, Chaitanya Publishing House, Allahabad
- Lutgens F. K., Tarbuck E. J. and Tasa D., 2009: *The Atmosphere: An Introduction to Meteorology*, Prentice-Hall, Englewood Cliffs, New Jersey.
- Oliver J. E. and Hidore J. J., 2002: *Climatology: An Atmospheric Science*, Pearson Education, New Delhi.
- Singh, S. 2007: *Climatology*, Sharada Pustak Bhawan, Allahabad.
- Thompson D. R. and Perry A. (eds.), 1997: *Applied Climatology: Principles and Practice,* Routledge, USA, and Canada.
- Trewartha G. T. and Horne L. H., 1980: *An Introduction to Climate*, McGraw-Hill.

Semester V
Course Code: GPH23C501
Course Name: Geographic Thought-I
Credits: 4=3+1+0 (L+T+P)
(Level 300)

This course introduces the students on the development of geographical thought from the ancient period to the contemporary period. It also seeks to give a general view on the chronology of geographical development to the present times. This course gives an idea of the different schools of geography that have evolved in time and space; the debates and discussions to place geography as a discipline and approaches of study on certain critical concerns such environmental determinism, possibilism, ecology relevant even at contemporary times.

The specific learning outcomes of the course are-

1. Understand the approaches and paradigms, past and present to study geography across the time and different landscapes
2. Identify critical issues of development and analysis
3. Appreciate the various philosophical changes that have led to the development of the discipline up to the Second World War

Unit	Content	No. of lectures
1	Evolution of geographical thought; nature and scope of geography; geography as an interdisciplinary and integrated discipline; subject matter of geography	8
2	Chronological development of geography during ancient and medieval periods -Greeks, Romans, Indian, Chinese and Arabs; age of explorations	8
3	Modern geography: Contributions of Germans, French, American and British geographers; environmental determinism, possibilism, empiricism, morphology of landscape, human ecology, chorology and areal differentiation, neo-determinism, probabilism	8
4	Dualism in geography- systematic vs. regional, physical vs. human, idiographic vs. nomothetic; impact of evolutionary biology in geographical thought	8
5	The beginning of contemporary phase in geography: the Schaefer-Hartshorne debate; quantitative revolution-merits, demerits, and its impact	8
6	System approach in geography	3

Suggested Reading:

- Abler, R., Adams, J. and Gould, P.P., 1971: Spatial Organization: The Geographers' View of the World, Prentice Hall, Englewood Cliff
- Adhikari, S., 1992: Geographical Thought, Chailnaya, Allahabad
- Chorley, R.J. &Hagget, P. (eds.) 1967: Models in Geography, Methuen, London
- Dikshit, R.D., 1997: Geographical Thoughts: A Contextual History of Ideas, Prentice Hall of India, New Delhi.
- Hussain, M., 1989: Evolution of Geographic Thought, Rawat Publications, Jaipur
- Hartshorne, R., 1939: The Nature of Geography, Rand McCulley, Chicago
- Hartshorne, R., 1959: Perspective on the Nature of Geography, Indian edition, Scientific Publishers, Jodhpur
- Harvey, D., 1969: Explanation in Geography, St. Martin Press, New York
- Johnston, R.J. (ed): The Dictionary of Human Geography, Oxford, Basil, Blackwell

Rana,R., 2008: Geographic Thought: A Systematic Record of Evolution, Concept Publishing House, New Delhi

Semester: V

Course Code: GPH25C502
Course Name: Advanced Geomorphology
Credits: 4 = 3+0+1 (L+T+P)
(Level: 300)

This course encompasses theoretical, conceptual, and practical foundation of geomorphology. After the completion of the course, the students will have the ability to relate concepts and theories to the processes of physical landscape. The practical component of the course is designed to learn the techniques of geomorphological analysis using modern tools.At the end the course student will learn the importance of geomorphology in understanding the physical world and the development of the discipline in contemporary period.

Learning outcomes:

1. Understand the theoretical, practical, and conceptual foundation of geomorphology
2. Use techniques of geomorphological analysis and relate in man-nature interactions
3. Design maps on relief by selecting proper geomorphic technique of representation

Unit	Content	No. of classes
1	Fundamental concepts in Geomorphology: Catastrophism and Uniformitarianism, Concepts of landform evolution by Davis and Penck, Systems approach in geomorphology, Dynamic Equilibrium, Steady State, Threshold	12
2	Plate tectonics as a unified theory of global tectonics, Theories of slope evolution – Davis Penck and King	10
3	Trends in geomorphological study: Climatic geomorphology and morphogenetic regions, Structural and Tectonic Geomorphology, Quantitative geomorphology, Process geomorphology	10
4	Applied geomorphology: Concepts and principles Palaeo-geomorphology Hydro-geomorphology, Environmental geomorphology	8
5	Concept of drainage basin, drainage types and patterns	5
Practical	Drainage ordering – Horton and Strahler method, Measurement of Drainage Area Drainage density, Stream frequency, Slope Analysis - Wentworth and Smith Method, Hypsometric Curve and integral.	15

Reading Lists:

- Geomorphology: Pure and Applied by M G Hart, pub: Allen and Unwind (publishers) Ltd, UK
- Geomorphological Techniques edited by Andrew Goudie et al , Routledge London and New York
- Fundamentals of Fluvial Geomorphology by Ro Charlton, Routledge
- The Basics of Geomorphology by K J Gregory and John Lewin, Sage
- Fluvial Forms and Processes by David Knighton, Pub:Arnold- Heinemann
- Principles of Geomorphology by W D Thornbury, Wiley Eastern Limited
- Fluvial Processes in Geomorphology by Luna B Leopold, M Gordon Wolman and John P Miller Pub: S Chand and Company

Semester V
Course Code: GPH23C503
Course Name: Cartographic Techniques: Surveying and Map Projections
Credits: 4 = 3+0+1 (L+T+P)
(Level 300)

The objective of the course is to develop an understanding of the shape of the Earth and its cartographic use, coordinate systems and directions. The course is designed to enable the students to choose map projection according to the purpose of map-making. The objective of the course is also to offer practical knowledge to the students on handling survey instruments like Plane table, Prismatic compass, Theodolite and Dumpy level.

On completion of the course, the students shall be able to,

1. Develop an understanding of the concepts regarding scale, coordinate system and map projections to suit map purposes,
2. Carryout traversing, levelling and triangulation surveying including general field marking for preparing topographical maps,
3. Create professional and aesthetically pleasing maps through thoughtful application of Cartographic conventions.

Unit	Contents	No. of lectures
1	Earth: shape, concept of geoid and ellipsoid, cartographic use of sphere, ellipsoid and geoid, Concept of Datum; orthometric, geoid and ellipsoidal heights	10
2	Properties of graticules, reference system- geocentric and geodetic co-ordinates, direction of coordinate & their function- concept of magnetic, true and grid north.	10
3	Map projection-concept and classification, properties of different map projections (zenithal, conical, cylindrical), choice of map projection, Concept and use of Lamberts, Mercators,Mollweides, and UTM projections	10
4	Surveying: definition, principles and types of surveying, concepts of bearings and angles, equipmentsand methods of surveying –Plane table, Prismatic compass, Theodolite and Dumpy level	15
5	Practical Construction, properties, uses and limitations of i. Polar zenithal gnomonic projection, ii. Polar zenithal equal area projection, iii. Cylindrical equal area projection, iv. Conical one standard parallel projection, v. Bonne's projection **Field Surveying:** i. Plane table survey using radiation method,	15

	ii. Closed traverse survey by prismatic compass iii. Contour mapping by dumpy level iv. Measuring height of accessible object using Theodolite	

Suggested Readings:

- Anson R. and Ormelling F. J., 1994: *International Cartographic Association: Basic Cartographic* Pregmen Press.
- Gupta K.K. and Tyagi, V. C., 1992: *Working with Map, Survey of India*, DST, New Delhi.
- Kanetkar T. P. and Kulkarni S. V., 2011: Surveying & Levelling Vol - I, Vidyarthi Griha Prakashan
- Loxton J., 1980: *Practical Map Production*, John Wiley.
- Punamia B.C., Jain A.K., Jain A.k., 2005: Surveying, Volume I, Laxmi Publication (P) Ltd.
- Rhind D. W. and Taylor D. R. F., (eds.), 1989: *Cartography: Past, Present and Future*, Elsevier, International Cartographic Association.
- Robinson A. H., 2009: *Elements of Cartography*, John Wiley and Sons, New York.
- Sarkar, A., 2008: *Practical Geography: A Systematic Approach*, Orient Longman Pvt. Ltd., Kolkata.
- Singh R. L. and Singh R. P. B., 1999*: Elements of Practical Geography*, Kalyani Publishers.
- Steers J. A., 1965: *An Introduction to the Study of Map Projections*, London.
- Talukdar, S., 2010: *Introduction to Map Projections*, Eastern Book House, Guwahati

Semester V
Course Code: GPH23C504
Course Name: Political Geography
Credits:4=4+0+0 (L+T+P)
(Level 300)

This course will help the students to build up theoretical and conceptual foundation on political geography. The students will learn the developments in the field of political geography in the contemporary period and approaches of study; understand the territorial bases of the state and role of various geographic factors in shaping political history to outcomes at present. Through the course students will be able to identify the critical geo-political problems including politics of displacement and spatial issues of state and specifically about Southeast Asia.

Specific Learning outcome of the course

1. Understand theoretical and conceptual foundation of political geography
2. Identify and understand certain critical geo-political and development problems
3. Learn case study-based analysis and relevant public polices

Unit	Content	No. of lectures
1	Political geography- meaning, nature and scope; History and Development of Political-geographical thought; approaches to the study of political geography	12
2	Critical Geopolitics; Geopolitics in Germany (_1945), Cold War Geopolitics, Geopolitics in the contemporary world; Relation of political geography to Geopolitics, Geoeconomics and Political Science	10
3	State, nation and nation-state; Nationalism, Sovereignty, Governance, Democracy, Introduction to Electoral Geography	8
4	State as a Territory; nature and functions of frontier and boundary; classification of international boundaries; Concepts of Buffer State,Core, Periphery and Capital	8
5	World strategic views - theories of Lebensraum, Heartland and Rimland, Colonialism/Imperialism, Socialism, Neoliberalism, Globalization	10
6	Political Geography of India; Constitutional development, structure of Indian Federalism; Geopolitical problems of India with special reference to Northeast India - changing political map, secessionist movements, insurgency, border dispute and identity politics	12

Reading list:

- Agnew J., Mitchell K., and Toal G. (eds.), 2003.*A Companion to Political Geography*, Blackwell Publishing Ltd.
- Chopra, G., 2006. *Political Geography.* New Delhi: Commonwealth Publishers.
- Cox, Kevin, Jennifer Robinson, and Murray Low. (eds.), 2007: *The SAGE handbook of political geography*.SAGE Publications Ltd
- Dikshit, R. D., 1982. *Political Geography: The Spatiality of Politics.* New Delhi: Tata Mc Graw Hill.
- Gallaher C., Dahlman C.T., Gilmartin M. and Mountz A., 2009: *Key Concepts in Political Geography*, SAGE Publications Ltd
- Mohanty, G. S., 2005. *Political Geography.* Delhi: ISHA Books.
- Pounds, N. J., 1972. *Political Geography.* New York: Mc Graw Hill.
- Sukhwal, B. L., 1985. *Modern Political Geography of India.* New Delhi: Sterling Publishers.
- Painter J. and Jeffrey A., 2009.*Political Geography*, Sage Publications.

Semester V
Course Code: GPH23M501
Course Name: Soil, Biogeography and Oceanography
Credits:4=3+1+0 (L+T+P)
(Level 200)

This course introduces the basic concepts and features of associated with oceanography, soil, and biogeography. Students shall get acquainted with the physical features and environment of oceans, the movements and changes and outcomes observed in the forms of facilitation of economic activities as well as the calamities. Understanding on the biomes, people's living in different ecological settings and traditional ecological knowledge would offer an outlook to look at the world to ensure sustainability.

The specific learning outcomes are

5. Understand the basic concept and theories of oceanography, biogeography and soil studies, landscape, and spatial dimension of all components at global level,
6. Learn the ecosystems evolved around the ocean and soil,
7. Ability to relate human perceptions including development of traditional knowledge base in all forms of ecological settings.
8. Identification of emerging problems if any in spatial context and need of policy interventions.

Unit	**Content**	**No. Oflectures**
1	Definition and scope of oceanography, coral reefs and islands: conditions of growth, types of coral reefs	08
2	Ocean salinity, temperature, ocean deposits, bottom configuration of Indian, Atlantic and Pacific oceans; Tides, Waves, Ocean currents, Ocean- Atmosphere interactions - El Nino, La Nina; Marine resources and concerns for sustainability	11
3	Definition and scope of biogeography, biomes, ecology, and ecosystem – components, structure, types, ecotone, food chain and food web, energy flow, bio-geo chemical cycles, biodiversity hotspot and conservation	18
4	Factors and processes of soil formation, properties of soil,classification of soil, soil profile, soil catena, soil erosion and degradation; measures to check soil degradation	08

Suggested Readings:

- Anikouchine W. A. and Sternberg R. W., 1973*: The World Oceans: An Introduction to Oceanography*, Prentice-Hall.
- Garrison T., 1998: *Oceanography*, Wordsworth Company, Belmont.
- Gerald S., 1963: *General Oceanography: An Introduction,* John Willey & Sons, New York.

- Kershaw S., 2000: *Oceanography: An Earth Science Perspective*, Stanley Thornes, U. K.
- King C. A. M., 1962: *Oceanography for Geographers,* Edward Arnold.
- Pinet P. R., 2008: *Invitation to Oceanography* (Fifth Edition), Jones and Barlett Publishers, USA, UK, and Canada.
- Sharma R. C. and Vatal M., 1980: *Oceanography for Geographers,* Chaitanya Publishing House, Allahabad.
- Sverdrup K. A. and Armbrust, E. V., 2008: *An Introduction to the World Ocean*, McGraw Hill, Boston.
- Thurman H. V., 1996: *Essentials of Oceanography*, Prentice-Hall, New Jersey
- Bradshaw, M. J., 1979: *Earth and Living Planet*, ELBS, London.
- Bunting, B. T., 1967: *The Geography of Soil*, Hutchinson, London.
- Foth, H. D. and Turk, L. M. 1972: *Fundamentals of Soil Science*, John Wiley, New York.
- Govindarajan, S. V. and Gopala Rao, H. G., 1978: *Studies on Soils of India*, Vikas, New Delhi.
- Goudie, Andrew, 1981: *The Human Impact*, Basil Blackwell, Oxford.
- Huggett, R. J., 1988*: Fundamentals of Biogeography*. Routledge, London.
- Huggett, R. J., 1995: *Geoecology: An Evolutionary Approach*, Routledge, London.
- Hussain, M. (ed), 1994: *Biogeography (Part I&II),* Anmol Publications Pvt. Ltd., New Delhi.
- Newbiggin: *Plant and Animal Geography.*
- Pears, N., 1985: *Basic Biogeography*. 2nd Edition, Longman, London.
- Robinson, H., 1982: *Biogeography*, E.L.B.S., Mc Donald & Evans, London.
- Russell, E.W., 1973: *Soil Condition and Plant Growth*, Longman, London.
- Mc. Bride, M. B., 1999: *Environmental Chemistry of Soils*, Oxford University Press, New York
- Odum, E. P., 1971: *Fundamentals of Ecology,* W.B. Saunders, Philadelphia.
- Singh, S. 1991: *Environmental Geography*, Prayag Publications, Allahabad.
- Smith, R. L., 1977: *Ecology of Man- An Ecosystem Approach.*
- Spellberg, I. F. & Sawyer, J. W. D., 1999: *An Introduction to Applied Biogeography*, Cambridge University Press.
- World Resources, 2001: *People and Ecosystems*; World Resources Institute, Washington.

Semester VI

Course Code: GPH23C601
Course Name: Social and Cultural Geography
Credits: 4 = 3+1+0 (L+T+P)
(Level 300)

The objective of the course is to introduce the students to the concepts and various facets of the society and culture.

Learning outcomes:

1. Gain insight into the scope, approaches of study in social geography.
2. Understand the concepts of caste, tribe, ethnicity, culture, race, social changes and social problems faced by different societies, etc.
3. Understand and visualize how the society functions.

Unit	Content	Lectures
I	Origin, nature and scope of social geography, approaches in social geography. Concept of space and place, types and characteristics of space	12
II	Social categories: Concepts of caste, tribe, class, ethnicity; Social structure and social process, factors and impacts of social change, social problems and issues in India	12
III	Definition and concepts of culture, components of culture, cultural assimilation and diffusion, world cultural regions	10
IV	Race and racism, basis of racial classification, spatial diffusion and distribution of races, folk culture and regions with regional focus – Northeast India	12

Suggested Readings:

- Ahmed, A., 1999: Social Geography, Rawat Publications, Jaipur and New Delhi
- Ahmed, A., (ed), Social Structure and Regional Development, A Social Geography Perspective, Rawat Publications, Jaipur
- Eyles J: 'Social Geography' in Johnston, R.J., et al, *The Dictionary* of *Human Geography*
- Jones, E and Eyles, J: An introduction to Social Geography, Oxford University Press, London
- Sen, J.: A textbook of Social and Cultural Geography Kalyani Publishers, New Delhi
- Taher, M.: An introduction to Social Geography, Northeast India Geographical Society, Gauhati University, Guwahati

- Pahl, R.: 'Trends in Social Geography', Chorley and Haggett (ed.) *Frontiers in Geographical Teaching*.
- Sharma, H.N.: Social Geography: Perspective on its definition and development', *Journal of Geography*, Vol.3. Gauhati University, Guwahati
- Knowles, R. & Wareing, J.: *Economic and Social Geography*, Rupa and Co., Kolkata
- Pahl, R.: 'Sociological models in Geography', in *Models in Geography*, Chorley and Haggett (ed.)

Semester VI

Course Code: GPH23C602
Course Name: Environmental Geography
Credit: 4 = 3+1+0 (L+T+P)
(Level 300)

This course will make students aware of environmental problems, laws, policies and regulations available for environmental protection. This paper will develop an ethical consideration to environment and its components and will give insights on environmental impact assessment and disaster management. The course also outlines the roles of environmental education and imparts different international treaties and convention with respect to sustainable development.

Learning outcome:

1	Understand the concept and problems related to environmental concerns in contemporary times.
2	Analyse human perceptions and behaviour and human environment relationship.
3	Understand the environmental laws and policies, convention and treaties and environmental ethics and education.
4	Evaluate the application of Organizational responses to disaster.

Unit	Contents	No of Lectures 48
1	Meaning and scope of environmental geography: ecology and ecosystem, concepts and types of ecosystem, human ecological relationship and adaptation.	6
2	Environmental issues: global warming and climate change, acid rain, desertification, air, water, noise, land pollution, water crisis-water deficit and surplus situations, environmental degradation, environmental conflicts	8
3	Hazards and disaster: types of hazards and disaster, geographic distribution of natural hazards, risk and vulnerability, risk identification and assessment, disaster management and policies.	8
4	International environmental convention and treaties: Stockholm conference 1972, Nairobi declaration 1982, Montreal protocol, Vienna Convention 1985, Rio Conference 1992, Kyoto Protocol 1997, Basel Convention 1989, Convention on biological diversity. Paris 2016	6
5	Environmental ethics, concepts and philosophy of biocentrism and centrism, environmental equity and justice, environmental education, traditional ecological knowledge	6
6	Environment and Development Issues; Sustainable development and its goals,	4
7	Environmental policy, laws and movements in India. National Environmental Policy 2006, green funding and taxes, green benches, objectives and roles of central and state pollution control board, bio-medical waste management rules 2016, solid waste management;	10

Suggested Readings:

* Bishov, V. (2001) Hazards and responses, (*2nd edition*) Collins, London.
* Charles, H. E. (2011) Environmental impact assessment, CRC press, New York.
* Chandna, R. C. (2003) Environmental Geography, Kalyani Publishers, New Delhi.
* Cutter and Susan, L. (1999) Environmental Risk and hazards, Prentic Hall, New Delhi.
* Fellenberg, G. (1999) Chemistry of pollution, John Wiley and Sons, New Delhi.
* Frampton, C.; Hardwick and McNaught (1999) Causes, Consequences and management of disasters, Hodder and Stoughton, London.
* Gupta, H. K. (2003) Disaster Management, University Press India Pvt. Ltd.
* Keith, S. (2002) Environmental hazards; assessing risk and reducing, Routludge, London.

* Mishra, R. P. (1995) Environmental ethics, Concept Publishing Company, New Delhi.
* Pine, J. (2015) Hazard analysis, reducing the impact of disaster, 2nd edition, CRC Press, Bocaroten, London, New York.
* Sharma, P. D. (2003) Ecology and environmental Sciences, Rostogi publications, Meerut, India.
* Singh, G. (2005) Environmental laws in India, MacMillan, New Delhi.
* Singh, S. (2014) Environmental Geography, Prabalika Publications, Allahabad.
* Singh, S. and Saroha, J. (2019). Geography of India, 2nd edition, G. K. Publications Pvt. Ltd.
* Srivastava, D. C. (2005) Readings in Environmental Ethics; Multidiciplinary prospectives, Rawat Publications, Jaipur.
* Tomar, A. (2011) Environmental Education, Kalpaj Publication, New Delhi.
* Trivedi, R. K. and Goel, P. K. (2010).An introduction to Air Pollution, DVS Publication, New Delhi.
* Wright D. A, and P. Welbourn (2002). Environment Toxicology, Cambridge University Press, London.

Semester VI
Course Code: GPH23C603
Course Name: Remote Sensing and Geographical Information System
Credit: 4=3+0 +1 (L+T+P)
(Level 300)

Learning Outcomes:

The Remote Sensing (RS) and Geographical Information System (GIS) course provides a comprehensive understanding of GIS and RS principles, concepts, and theories.

1. Students will develop practical skills in using GIS and RS software tools, enabling them to collect, process, analyze, and interpret spatial data.
2. The course emphasizes effective data management practices, including acquisition, quality control, integration, and sharing of geospatial data.
3. Students gain proficiency in spatial analysis and modeling techniques, allowing them to extract meaningful information and solve complex geospatial problems.
4. The course fosters critical thinking, problem-solving, decision making and communication skills, enabling students to apply geospatial knowledge in diverse domains and collaborate effectively on geospatial projects.

Course Content:

Unit	Contents	No of classes
1	Remote Sensing: definition, historical development, platforms and types	6
2	Principles of Electromagnetic Radiation (EMR), Spectral Signature, Interaction of EMR with atmosphere and earth surface; application of Remote sensing (Disaster Risk Reduction, & Natural Resources)	10
3	DEM/ DSM: Data sources, characteristics and application, ASTER and SRTM DEM (nature and its characteristics; digital image processing: concepts and techniques	7
4	Geographical Information System (GIS) - definition, components, data types and structure, earth models and referencing systems; application of GIS (research, management, planning, and decision support system).	10
5	Concept of database management system (DBMS) and relational database management system (RDBMS).	6
6	Unmanned Aircraft System (UAS): principles, mission plan, rules and regulations (Drone rules, 2021, Part I-VIII (India))	6
Practical	Landuse/ Landcover classification and area calculation (supervised & unsupervised) and Normalized Difference Vegetation Index (NDVI) DEM creation using GPS points (auto import from handheld GPS/mobile phone/ DGPS) and text to points (manual import) Geo-referencing, Digitization (point, line & polygon), map layout of campus from google earth/scanned photo	16

Suggested Readings:

- Burrough P. A. and McDonnell R. A., 2000: Principles of Geographical Information Systems-Spatial Information Systems and Geostatistics, Oxford University Press.
- Campbell, J. B. (2015). Introduction to remote sensing. CRC Press.
- Chang, K. T. (2018). Introduction to geographic information systems. McGraw Hill Education.
- Clarke K. C., 2001: Getting Started with Geographic Information Systems, Prentice Hall.
- DeMers M. N., 2000: Fundamentals of Geographic Information Systems, John Wiley & Sons.
- French, G. T. 1996: Understanding the GPS: An Introduction to the Global Positioning System,
- Geo Renternational Association of Hydrological Sciences. (2019). GIS and remote sensing in hydrology. Grafiati.
- Foody, G. M. (2015). Remote sensing of vegetation: Principles, techniques, and applications. Routledge.

- Jensen, J. R. (2013). Remote sensing of the environment: An earth resource perspective. Pearson Education.
- Jensen, J. R., & Cowen, D. J. (1999). GIS and remote sensing integration for environmental applications. International Journal of Geographical Information Systems, 10(7), 877–890.
- Lillesand, T. M., Kiefer, R. W., & Chipman, J. W. (2015). Remote sensing and image interpretation. Wiley.
- Mather, P. M. (2016). Computer processing of remotely sensed images: An introduction. John Wiley & Sons.
- Weng, Q. (2015). Remote sensing and GIS integration: Theories, methods, and applications. McGraw Hill Education.

Semester VI
Course Code: GPH23C604
Course Name: Geography of Resources and Economic Activities
Credits: 4 = 3+1+0 (L+T+P)
(Level 300)

This course introduces the concept of natural resources, and discusses distribution, utilization, and management of natural resources towards sustainable use. Presence of natural resources though largely determine location of economic activities and there are established theories of location; the emergence of new economic activities particularly in secondary, tertiary, quaternary and quinary need to be looked at from new perspectives in this globalized environment.

Learning outcomes of this paper are

1. Understand specific concepts and examine pressing issues related to use and conservation of natural resources.

2. Understand the spatial perspectives of resource distribution.

3. Understand different types of economic activities and their utilities.

4. Appreciate the factors responsible for the location and distribution of activities.

5. Examine the significance and relevance of theories in relation to the location of different economic activities.

Unit	Content	No. of lectures
1	Natural resources: concept and classification; Energy resources: Conventional and non-conventional	4
2	Distribution, utilization, conservation of natural resources: methods and techniques (special emphasis on water and forest resources), sustainable resource development and	10

	management	
3	Concept and classification of economic activity; Factors affecting location of Economic activity with special reference to Agriculture (Von Thunen theory), Industry (Weber's theory), Agriculture and Industrial activities with a focus on technological innovations and development in the context of liberalisation and globalisation.	10
4	Primary economic activities: agriculture and its types, forestry, fishing, and mining.	8
6	Secondary activities: industries and their types, Concept of manufacturing region, Special Economic Zones, Exclusive Economic Zones, and Technology Parks.	8
7	Tertiary activities (Transport, Trade and Services), quaternary, and quinary activities, Information and Communication Technology: Impact on Indian Economy	8

Suggested Readings:

- Cutter S. N., Renwich H.L. and Renwich W. (1991): *Exploitation, conservation, preservation: a geographical perspective on natural resources use*, John Wiley and Sons, New York.
- Gadgil M. and Guha, R. (2005): *the use and abuse of nature: Incorporating this Fissured Land: An ecological History of India and ecology and equity,* Oxford University press, USA
- Klee, G. (1991): *Conservation of natural resources*. Prentice Hall, England
- Mitchell, B. (1997): *Resources and Environmental Management*. Longman Harlow, England
- Owen S. and Owen P.L. (1991): *Environment, Resources and Conservation*, Cambridge University Press, New York.
- Alexander J.W. (1963): *Economic geography*, Prentice-Hall Inc., Englewood cliffs, New Jersey.
- Hodder, B. W. and Lee Roger (1974): *Economic Geography*, Taylor and Francis.
- Willington, D.E. (2008): *Economic Geography*, Husband Press
- Wheeler J.O. (1998): *Economic Geography*, Wiley
- Prithwish, Roy (2014): Economic Geography - A study of Resources, New Central Book Agency, Kolkata. 11.
- Saxena, H.M., (2013): Economic Geography, Rawat Publications, Jaipur

Semester VI

Course Code: GPH23M601
Course Name: Cartographic Techniques: Maps and Diagrams
Credits:4 =3+0+1 (L+T+P)
(Level 200)

The main objective of the course is to give the students an understanding of the various types of geographic data and different forms of data representation including maps, diagrams, and graphs. The course introduces the students to various components of maps and topographic sheets to analyse various aspects of the space. The course has a practical component where the adequate emphasis has been given on the applied aspects of the subject of emerging techniques of map-making. Keeping in mind the research-driven nature of the subject based on empirical data, this course introduces the spatial tools and techniques of interpreting topographic, weather, population, and economic data.

The following learning outcomes will be achieved

5. Exposing the students to the concepts, scope, and nature of cartographic information.
6. Familiarize students with diagrammatic data representation, enabling them to understand the meaning of information on relief, climatic, economic and population attributes and represent them.
7. Facilitate the students to learn map reading skills, students will develop cartography skills and learn skills of map-making.
8. Develop aptitude for acquiring the basic skills of processing and interpreting geographic data.

Unit	Contents	Class
1	Definition, nature, scope and development of cartography, impact of changing technology	5
2	Map elements, Map scale: classification of map scale, conversion of scale	5
3	Map: significance and classifications of map, map design and layout principle, map generalization. Thematic map – classification, challenges in thematic mapping; types of representation -chorochromatic, choropleth, isopleth, dot map, flow map, dissymmetric map, Quantitative thematic maps with proportional symbols	15
3	Diagrammatic Data Presentation – Dot, Line, Bar, Circle and Spheres to represent relief, climatic, population and economic data	15
4	Introduction to elements of topographical and weather maps	5
7	**Practical** Construction of scale: linear, comparative and vernier scale, computation of area using graphical method Mapping point features- qualitative and quantitative; line features-qualitative and quantitative	15

	Preparation of isopleths map using physical or environmental data, choropleth map using population, socio-economic data Quantitative thematic maps- simple dot map, proportional circle	

Suggested Readings:

- Gupta K.K. and Tyagi, V. C., 1992: *Working with Map, Survey of India*, DST, New Delhi.
- Loxton J., 1980: *Practical Map Production*, John Wiley.
- Mishra R.P. and Ramesh, A., 1989: *Fundamentals of Cartography*, Concept, New Delhi.
- Monkhouse F. J. and Wilkinson H. R., 1973: *Maps and Diagrams*, Methuen, London.
- Rhind D. W. and Taylor D. R. F., (eds.), 1989: *Cartography: Past, Present and Future*, Elsevier, International Cartographic Association.
- Robinson A. H., 2009: *Elements of Cartography*, John Wiley and Sons, New York.
- Singh R. L. and Singh R. P. B., 1999: *Elements of Practical Geography*, Kalyani Publishers.
- Singh G. 2004: *Map Work and Practical Geography*, Vikas Publishing House Pvt. Ltd., Delhi,
- Tyner J. A., 2010: *Principles of Map Design*, The Guilford Press.

Semester VII
Course Code: GPH24C701
Course Name: Geographical Thought- II
Credit: 4= 3+1+0 (L+T+P)
(Level: 400)

This course introduces the students to the philosophical developments in Human Geography since the Second World War. The course will enable the students to understand the rationale behind approaches and methods in geographical studies and research.

Learning Outcomes:
1. Understand philosophical basis of human geography
2. Relate philosophies to geographical concepts and nature of human geography

Unit	Content	Lecture
1.	Development of thought in Human Geography since late modern period/ 2nd world war: impact of positivism, quantitative revolution, locational analysis; rise of humanistic approach, idealism, phenomenology and existentialism; behavioural approach, welfare approach	12
2	Impact of Marxism, radical approach, structural Marxism, socio-spatial dialectic, political economy, political ecology	10
3	Postmodernism in geography, characteristics of postmodernism, differences with modernism, postmodern geographies; Social theories- constructivism and critical theory; feminism and gender geography	8
4	Post postmodernism – what is beyond post-modernism?	2
5	Paradigms and paradigm shift, Changing concepts of space – contributions E Soja, Lefebvre and Harvey, Edward Relph, Yu-Fu-Tuan	3
6	Contributions of Indian geographers to geography since modern period; Present trend of Indian Geography	10

Suggested Readings:

- Abler Ronald J, John S Adams, Peter Gould (1971): *Spatial Organization, A Geographer's View of the World*, Prentice Hall
- Adhikari Sudeepta (2011): *Fundamentals of Geographical Thought*, Orient Blackswan
- Dikshit R D (1997): *Geographiocal Thought*, Prentice Hall of India
- Harvey Milton E, Brian P Holly (1989): *Themes in Geographic Thought*, Rawat Publication
- Hussain M (2014): *Evolution of Geographical Thought*, Rawat
- Peet Richard (2003): *Radical Geography*, Rawat Publication
- Peet Richard (1998): *Modern Geographical Thought*, Blackwell
- Peet Richard and Nigel Thrift, eds(2017): *New Models in Geography*, Rawat Publication
- Smith D. M. (1974):*Who Gets What Where, and How: A Welfare Focus for Human Geography*, *Geography*, Vol. 59, No. 4 (November 1974), pp. 289-297 (9 pages) Published By: Taylor & Francis, Ltd.

- Soja Edward (1997): *Postmodern Geographies*, Rawat Publication

Semester VII
Course Code: GPH25C702
Course Name: Research Methodology
Credits: 4 = 3+0+1 (L+T+P)
(Level: 400)

This course is designed to provide a precise, but comprehensive knowledge on approaches to do research or go for detailed study on areas of student's interest. This course focuses on contextualisation of a research problem to design the research, derive the results and outcomes in a publishable front following the route of research ethics.

Course Outcomes:
1. Identify research issues, contextualize, and develop research problems and choose appropriate methods for study.
2. Acquire skills to collect data from field using conventional as well as the most advanced tools and techniques.
3. Develop ability to read and comprehend research articles critically and acknowledge through following the accepted and ethical procedure of referencing and bibliography.
4. Develop computer skills, with emphasis on quantitative techniques, perform relevant statistical analysis

Unit	Contents	No. of lectures
1	Definition of research, essential features of research; Ontology and Epistemology, Philosophical Perspectives for research, nature of geographic research, formulating and conceptualizing a research problem; inductive and deductive approaches in research; law, theory and model	10
2	Literature review and its significance, referencing systems – APA, Chicago style; citation management tools	6
3	Research methodology; Research design: Need and features of a research design, types of research design; formulation of research objectives, research questions and hypothesis	6
4	Qualitative research approaches - ethnography, grounded theory, case study, narrative analysis, discourse analysis; personalinterview, focus group discussion, qualitative observation, participatory method; thematic analysis – coding, content analysis,	8
5	Quantitative approaches in geographic research and their significance, need and limitations; construction of dimensions, variables and indicators of a theme, questionnaire and schedule; parametric and non-parametric data; geographic data matrix	10

6	Sources of geographic data: conventional, remote sensing, GIS, GPS; Data processing, analysis, and presentation	5
7	Research ethics: plagiarism; Writing a research report: structure, components, and presentation	5
8	Practical and Field Visit: Review of articles of Scopus indexed/peer reviewed journal on a specific topic (minimum 10 articles). Develop indicators, prepare and administer a survey schedule/Questionnaire on a relevant field and report writing.	15

Reading Lists:

- Ackoff, R. L., 1961: ***The Design of Social Research***, University of Chicago Press, Chicago.
- Berry B.J.L and Marble D. F. (eds) 1968: ***Spatial Analysis- A reader in Geography***, Prentice Hall, Englewood Cliffs, N. J.
- David E Grey, 2014: ***Doing Research in the Real World***, Sage
- Ebdon D. 1977: ***Statistics in Geography: A practical Approach***, (2nd edition 1991) Wiley
- FitzGerald, B. P. *et al* 1974: ***Science in Geography Series***, Oxford University Press, London
- Goode William, J. and Hatt, Paul K., 1952: ***Methods in Social Research***, McGrawHill Company, Inc., New York.
- Gregory, S. 2014: ***Statistical Methods and the Geographer***, Routledge
- Guthrie Gerard2010: Basic ***Research Methods***, SAGE publications, New Delhi.
- Hammond R. and McCullagh P. S., 1978: ***Quantitative Techniques in Geography***, Oxford University Press
- John W Creswell, 2014: ***Research Design: Qualitative, Quantitative and Mixed Method Approaches***, Sage
- Johnston R.J. 1973: ***Multivariate Statistical Analysis in Geography***, Longman, London
- King L.J. 1969: ***Statistical Analysis in Geography***, Prentice Hall
- Kothari, C. R., 1993: ***Research Methodology: Methods and Techniques***, 2nd ed.,
- Mahmood A., 1977: ***Statistical Methods in Geographical Studies***, Concept
- Mishra, R. P., 1989: ***Research Methodology: A Hand book***, Concept PublishingCompany, New Delhi.
- Misra, H. N. and Singh, V. P., 1998: ***Research Methodology in Geography***,Concept Publishing Company, New Delhi.
- Montello, Danial R. and Paul C. Sutton, 2006: ***An Introduction to ScientificResearch Methods in Geography***, Sage Publications, London.

- Nalwa, V., 1992: ***The A B C of Research for Behavioural and Social Sciences***, WileyEastern, New Delhi.
- Paul, S. K. 1998: ***Statistics for Geoscientist***, Tata McGraw Hill, New Delhi
- Prasad, H., 1992: ***Research Methods and Techniques in Geography***, RawatPublications, Jaipur
- Robinson, G. M. 1998: ***Methods and Techniques in Human Geography***, John Wiley & Sons, Chichester
- Rogerson, P 2006: **Statistical Methods for Geography** (2nd Edition), Sage Publications, London, New Delhi
- Wheeler, D. Shaw, G., Barr, S. 2013: ***Statistical Techniques in Geographical Analysis***(3rd edition) RoutledgeWiley Eastern Ltd., New Delhi.

Semester VII
Course Code: GPH24C703
Course Name: Political Economy of Regional Development
Credits: 4 = 4+0+0 (L+T+P)
(Level: 400)

The course serves as an introduction to contemporary political economy, both as a field that studies the connections between politics and economic development and as an application of economic paradigms to the explanation of political occurrences. Students will learn about several alternative theories, concepts, and methodological approaches throughout the course, with a focus on issues related to politics, economic development, regional development, and policy making.

Learning Outcomes:
1. Students will become familiar with the fundamental theories and perspectives of modern political economy.
2. With the obtained knowledge, they will be able to do independent study on a range of political and economic issues and select the best alternative analytical strategy.
3. This course will assist in explaining the evolution of various policies and providing a historically and socially based understanding of India's development experiences.

Unit	Content	No. of lectures
1	Understanding Political Economy: Emergence of Political Economy, Philosophical basis of Political Economy	10
2	State and the Economy: From Anarchy to a Centralised State, From Centralised to Inclusive States, Power, Identities and Narratives	10
3	Developmental Politics:Traditional system of production and transition, Developmental interventions and socio-economic consequences, Politics of	10

	development, consequences of rent seeking and deviations	
3	Political Economy and planning in India: Emerging trends in development planning, power and pressure groups, Efficacy of regional planning and development, Institutions for developments – inclusiveness of institutions and outcomes	10
4	Political Economy Development and Governance:Poverty, Inequality and Government Policy, Economics of Environmental Policy, Key Debates in Environmental Governance, Work and Employment in the Global/National Economy, Poverty and Development	10
6	Global Political Economy: International Finance for Development, Contemporary Issues in Development Finance, Comparing Capitalisms in the Global Political Economy, Creating a Sustainable World: Interdisciplinary Applications of the Sustainable Development Goals	10

Suggested Readings:

- Bagchi, A. K. (1984). Towards a political economy of planning in India. *Contributions to Political Economy*, 3(1), 15-38.
- Baker, M., Bulte, E., & Weisdorf, J. (2010). The origins of governments: from anarchy to hierarchy. *Journal of Institutional Economics*, 6(2), 215-242.
- Bardhan, P. (1984). *The political economy of development in India.* Oxford India.
- Bates, R. H. (Ed.). (2020). *Toward a political economy of development*. University of California Press.
- Beaud, M. (2004). *A history of capitalism, 1500-2000*. Aakar Books.
- Bhaduri, A. (2010). *Essays in the reconstruction of political economy*. Aakar Books.
- Engels, F. (1884). *The origin of the family, private property and the state*.

Semester VII
Course Code: GPH24C704
Course Name: South East Asia
Credits: 4 = 3+1+0 (L+T+P)
(Level: 400)

This course introduces the students to 10 countries of Southeast Asian region. This course shall help the students to understand the countries to their specific geographical settings, and their histories of development.

The post-World War II period shows significant structural changes inthe respective economies of South East Asian Countries. The development approaches of some countries appearing as a model particularly on economic and population policy fronts. This course also places India's Northeast region to the South East Asian countries on trade, cooperation and development initiatives. The geostrategic significance of the region emerging with formation of ASEAN as a regional organization is also an important component to study.

Learning outcomes:

1. Understand country specific landscape and development models (policies and programme) in historical and contemporary contexts
2. Evaluate the role of regional organisations for development; the geo-politics and dialogues
3. Apply time series data set to measure the development outcomes in the counties

Unit	Content	Lectures
1	South East Asia: Physiography, Climate, Natural resources, Historic and cultural links between India and South East Asian Countries	8
2	South East Asia in the global economy: Industry, Agriculture, Tourism and trade and the development models .	12
3	Population: Distribution, growth and migration streams, Population policies of selected Southeast Asian countries	10
4	South East Asia as a Geographical entity; Geo-strategic significance of South East Asia, ASEAN as a regional organization: aims and significance, ASEAN-Indian relations, conflict in the South China Sea.	8
5	Look East to Act East policy: Implications for North East India, Problems in India's connectivity projects and Sino-Indian border issues, Challenges related to golden triangle, insurgencies along border and Free trade Agreement, Prospects of Assam as India's corridor to South East Asia	10

Suggested Readings:

- ASEAN Statistical Year Books – various years
- Amitendu Palit (2016) India's Act East Policy and Implications For Southeast Asia, Southeast Asian Affairs, pp. 81-92, ISEAS - Yusof Ishak Institute Stable URL: http://www.jstor.com/stable/26466920
- The Asian Population and Development Association (APDA) March 1998; Comparative Study of Population Policies in Asia, —Focus on Eight Asian Countries
- Gavin W. Jones (1985) Population Policies in Southeast Asia and Australia: The International Relevance of Domestic Affairs, Journal of the Australian Population Association, Vol. 1, No. 2 (March 1985), pp.109-120; https://www.jstor.org/stable/41110848
- Venkatachalam Anbumozhi and Kaliappa Kalirajan , (2020) South Asia's Economic Integration with East Asia, Journal of Economic Integration , Vol. 35, No. 1, Special Issue pp. 91-110 Published by: Centre for Economic Integration, Sejong University Stable URL: https://www.jstor.org/stable/10.2307/26891715
- Graeme Hugo (2012) International Labour Migration and Migration Policies in Southeast Asia, Asian Journal of Social Science, Vol. 40, No. 4, Special Focus: Migrant Workers Between States: In Search of Exit and Integration Strategies in

South East Asia (2012), pp. 392-418 Published by: Brill Stable URL: https://www.jstor.org/stable/43500550

- Peter A. Coclanis and Tilak Doshi (2000) Globalization in Southeast Asia, The Annals of the American Academy of Political and Social Science, July 2000, Vol. 570, Dimensions of Globalization, pp. 49-64, Sage Publications, Inc. in association with the American Academy of Political and Social Science Stable URL: https://www.jstor.org/stable/1049239

Course Code: GPH24DPW701: Dissertation/Project Work Part I

Semester VII
Course Code: GPH24M701
Course Name: Geography of Health and Wellbeing
Credits: 4= 3+1+0 (L+T+P)
(Level 300)

This course introduces students to the study of epidemiology of diseases, ecology of diseases and mapping in the country context. In doing so the students learn the perspectives of health and wellbeing, state provisioning on health care and responsiveness of the stakeholders towards better outcome on health indicators. Students in the process shall learn measures of several wellbeing indices adopted across the world at present.

The specific learning outcome of this course will be –

1. Understand and get acquainted with the key concepts on health and wellbeing
2. Understand approaches of the state and existing public policies towards wellbeing
3. Use of health and wellbeing related data sets
4. Application of quantitative methods to have measures on different facets health wellbeing.

Unit	Contents	No of lectures
1	Definition of Health Geography, its scope and importance, epidemiology of diseases, disease ecology and disease mapping	10
2	Influence of society and culture on health, causes and spread of communicable diseases, environmental pollution and health	8
3.	Planning and provision of health services. Role of government, NGOs in educating people about health issues, accessibility and health care planning	10
4	Definition and types of wellbeing, socio- spatial inequalities in wellbeing; causes and effects	8
5	Role and importance of wellbeing measures, Human Development Index, Happiness Index, global happiness levels, poverty and well being	9

Reading List:

- Geography, Health and Sustainability: Gender matters globally, edited by Allison Williams, Isaac Lizinaah, Routledge Publications, U.K.
- Geography of Health by R.P. Mishra, Concept Publishing Company, New Delhi.
- An introduction to the Geography of Health by Peter Anthamatten and Helen Hazen, Routledge Publications, U.K.
- Sense of Place, Health and Quality of Life by Allison Williams, John Eyles, Routledge Publications, U.K.
- Environments, Risks and Health: Social Perspectives by John Eyles, Jamie Baxter, Roulledge Publications, U.K.
- Geographies of Health and Development ed. By Rachel Benzer Kerr, Isaac Luginaah, Routledge Publications, U.K.

Semester VIII
Course Code: GPH24C801
Course Name: Applied Statistics
Credits 4 =2+0+2 (L+T+P)
(Level: 400)

Adhering to importance of quantitative approach in geographical studies this course teaches some advance statistics often applied in the discipline of geography.

Course outcomes:

1. Understand significance of quantitative approach in geographical studies
2. Learn the concept and rationality behind use of the advance statistical concepts often used and apply them in appropriate context.

Unit	Content	Lectures
1	Probability distribution – normal, binomial and poisson	5
2	Hypothesis Testing: parametric and non-parametric test- t- test, f-test, ANOVA, chi square	5
3	Simple Regression analysis: regression line, regression residuals, standard error estimate; Multiple Regression analysis: linear, logistics and polynomial; Regression with logarithmic and quadratic form; Multicollinearity; Heteroscedasticity	10
4	Spatial distribution and interaction: Nearest Neighbour Index, Network Analysis Location Quotient Spatial Measures of Centrality - Mean center of population settlements; Measures of inequality- Disparity index, Diversity index	5
5	Principal Component Analysis and its applications; Cluster analysis	5
6	**Practical:** Use of MS Excel or statistical packages (SPSS/STATA/R) for i. Hypothesis Testing: t- test, f-test, ANOVA, chi square ii. Multiple regression analysis: linear, polynomial, logarithmic and quadratic form iii. Location Quotient, Lorenz Curve, Gini's Coefficient iv. Principal Component Analysis and mapping of development patterns	30

Suggested Readings:

- Berry B.J.L and Marble D. F. (eds) 1968: ***Spatial Analysis- A reader in Geography***, Prentice Hall, Englewood Cliffs, N. J.
- Ebdon D. 1977: ***Statistics in Geography: A practical Approach***, (2nd edition 1991) Wiley
- FitzGerald, B. P. *et al* 1974: ***Science in Geography Series***, Oxford University Press
- Gregory, S. 2014: ***Statistical Methods and the Geographer***, Routledge
- Hammond R. and McCullagh P. S., 1978: ***Quantitative Techniques in Geography***, Oxford University Press
- Johnston R.J. 1973: ***Multivariate Statistical Analysis in Geography***, Longman, London
- King L.J. 1969: ***Statistical Analysis in Geography***, Prentice Hall
- Mahmood A., 1977: ***Statistical Methods in Geographical Studies***, Concept
- Paul, S. K. 1998: ***Statistics for Geoscientist***, Tata McGraw Hill, New Delhi
- Robinson, G. M. 1998: ***Methods and Techniques in Human Geography***, John Wiley & Sons, Chichester

- Rogerson, P 2006: **Statistical Methods for Geography** (2nd Edition), Sage Publications, London, New Delhi
- Wheeler, D. Shaw, G., Barr, S. 2013: ***Statistical Techniques in Geographical Analysis***(3rd edition) Routledge

Semester VIII
Course Code: GPH24C802
Course Name: Urban Studies
Credit: 4 = 3+1+0 (L+T+P)
(Level: 400)

The course on urban studies provides the students an understanding of the processes of urbanization, concepts on urban studies, relation between urbanization, development, globalization and other social issues. The course highlights the significance of sustainability of urbanization process in achieving social and environmental justice.

Course outcomes:
1. Understand the significance of urban studies in geography
2. Understand the basic concepts and approaches to urban studies
3. Analyse the planning and policies to address urban issues
4. Evaluate the role of economic and political processes on resultant urban structure

Unit	Content	Lecture
1	Urban Studies in Geography – History and significance; Urban Geography – meaning, nature and scope	4
2	Urban settlements-classifications on the basis of size and function; concepts of - urbanization, urbanism, rurban, umland; urbanization and development processes ; urban ecology, gentrification;	10
3	Approaches in urban studies – locational analysis, spatial network analysis, socio-cultural, institutional, political economy and postmodern; bid rent theory, urban land use models- Concentric zone, sectoral, multiple nuclei and exploitative model; Christaller's theory, rank-size rule, primate city, problem areas of city, city and social justice, power of place	15
4	Urban Renewal, Urban planning and policies –principles and objectives; urban governance – structure and agency of local governance in India, urban policies of India, smart city mission	10
5	Impact of Globalisation on urban space, exclusion and inequality; urban sustainability and urban health	6

Suggested Readings:

- Carter Harold (1995): *The Study of Urban Geography*, Hodder Arnold
- GlaeserEdward L (2011): *Triumph of the City: How Our Greatest Invention Makes Us Richer, Smarter, Greener, Healthier and Happier,*Penguin Press
- HarveyDavid(2012): *Rebel Cities: From the Right to the City to the Urban Revolution*, Verso
- JacobsJane (2002): *The Death and Life of Great American Cities,*Random House
- Jonas Andrew E. G. , Eugene McCann, Mary Thomas (2015) : *Urban Geography: A Critical Introduction (Critical Introductions to Geography)*, Wiley-Blackwell
- LefebvreHenri, Donald Nicholson-Smith (Translator) (1992) *The Production of Space*,Blackwell
- Longley Paul A. (2005): *Urban Studies, Encyclopaedia of Social Measurement*, Pages 921-926
- Maurya S.D. (2022) :*Urban Geography*, Sharda Pustak Bhawan
- Moskowitz,Peter, P.E. Moskowitz (2017): *How to Kill a City: Gentrification, Inequality, and the Fight for the Neighborhood*, Bold Type Books
- MumfordLewis (1968): *The City in History: Its Origins, Its Transformations, and Its Prospects,*Mariner Books
- Paddison Ronan ed (2000):*Handbook of Urban Studies*, Sage
- Paddison Ronan ed (2010): *Urban Studies, Economy and Society*, Sage
- Paddison Ronan, Eugene McCann (2014): *Cities and Social Change*, Sage
- Paddison Ronan, Tom Hutton (2014): *Cities and Economic Change*, Sage
- Patel Sujata, KushalDeb (2009):*Urban Studies*,Oxford University Paperback(OUP) India
- Siddhartha K. , S Mukherjee (2019) :*Cities Urbanisation and Urban Systems*, Kitabmahal

Course Code: GPH24DPW801
Dissertation/Project work Part II

Students will prepare dissertation report on a topic defined in the seventh semester. The report should contain methodology in detail, collect relevant qualitative /quantitative information and carry out analysis using appropriate method. The reports should be of around 6000 to 8000 words. Students should strictly follow research ethics while writing the report.

Semester VIII
Course Code: GPH23M801
Course Name: Geography of Resources and Economic Activities
Credits 4 = 3+1+0 (L+T+P)
(Level 300)

This course introduces the concept of natural resources, and discusses distribution, utilization, and management of natural resources towards sustainable use. Presence of natural resources though largely determine location of economic activities and there are established theories of location; the emergence of new economic activities particularly in secondary, tertiary, quaternary and quinary need to be looked at from new perspectives in this globalized environment.

Learning outcomes of this paper are

1. Understand specific concepts and examine pressing issues related to use and conservation of natural resources.

2. Understand the spatial perspectives of resource distribution.

3. Understand different types of economic activities and their utilities.

4. Appreciate the factors responsible for the location and distribution of activities.

5. Examine the significance and relevance of theories in relation to the location of different economic activities.

Unit	Content	No. of lectures
1	Natural resources: concept and classification; Energy resources: Conventional and non-conventional	4
2	Distribution, utilization, conservation of natural resources: methods and techniques (special emphasis on water and forest resources), sustainable resource development and management	10
3	Concept and classification of economic activity; Factors affecting location of Economic activity with special reference to Agriculture (Von Thunen theory), Industry (Weber's theory), Agriculture and Industrial activities with a focus on technological innovations and development in the context of liberalisation and globalisation.	10
4	Primary economic activities: agriculture and its types, forestry, fishing, and mining.	8
6	Secondary activities: industries and their types, Concept of manufacturing region, Special Economic Zones, Exclusive Economic Zones, and Technology Parks.	8
7	Tertiary activities (Transport, Trade and Services), quaternary, and quinary activities, Information and Communication Technology: Impact on Indian Economy	8

Suggested Readings:

- Cutter S. N., Renwich H.L. and Renwich W. (1991): *Exploitation, conservation, preservation: a geographical perspective on natural resources use*, John Wiley and Sons, New York.
- Gadgil M. and Guha, R. (2005): *the use and abuse of nature: Incorporating this Fissured Land: An ecological History of India and ecology and equity,* Oxford University press, USA
- Klee, G. (1991): *Conservation of natural resources*. Prentice Hall, England
- Mitchell, B. (1997): *Resources and Environmental Management*. Longman Harlow, England
- Owen S. and Owen P.L. (1991): *Environment, Resources and Conservation*, Cambridge University Press, New York.
- Alexander J.W. (1963): *Economic geography*, Prentice-Hall Inc., Englewood cliffs, New Jersey.
- Hodder, B. W. and Lee Roger (1974): *Economic Geography*, Taylor and Francis.
- Willington, D.E. (2008): *Economic Geography*, Husband Press
- Wheeler J.O. (1998): *Economic Geography*, Wiley
- Prithwish, Roy (2014): Economic Geography - A study of Resources, New Central Book Agency, Kolkata. 11.
- Saxena, H.M., (2013): Economic Geography, Rawat Publications, Jaipur

Semester VIII
Course Code: GPH24C803
Course Name: North East India
Credits: 4 =3+1+0 (L+T+P)
(Level: 400)

This course will enable the students to broaden and deepen their understanding of Northeast region of India. The students shall get the opportunity to place the region with the readings and knowledge acquired on different conceptual and theoretical components in historical and contemporary context – ecology, economy and society.

Course Outcomes:

1. Understand the region's landscape, natural resources, population and economic activities
2. Identify and understand the critical factors associated with development of the region
3. Understand public policies related to development

Unit	**Contents**	No. of lecture
1	The Idea of 'Northeast' in Historical Context; the Geographies and Developments, Colonial Historiography and the emergence of present North East India; Colonial Annexation and Integration with Global Market – Colonial interventions on resources and production spaces and their implications on the landscape and economy; Agrarian relations and changes to contemporary times.	10
2	People and Population characteristics: Population, growth, distribution, and density, rural- urban and religious composition, literacy, trends of urbanization.	10
3	New Initiatives in the Economy: Land use and cropping pattern changes, Industry and services sectors.	10
4	Socio- economic and geopolitical issues: Disparity in socio- economic development, immigration and emigration, discontents and conflict, border dispute, demand, and emergence of new state/ district.	10
5	Planning and development – Institutions for development, developmental interventions and social consequences, Rhetoric of development, the deviations	8

Reading Lists:

- A Pankaj, A Sharma, Antora Borah, Editors (2021) Social Sector Development in North East India, Sage, Chapter 3 – Demographic Changes in Northeast India, Chapter 9 – Poverty in NE India, Chapter 10, Unemployment and Outmigration, Chapter 12 on Nation State and NE India, Chapter 13 on Fiscal Decentralization and Development, Chapter 14 on Regional Councils
- Amalendu Guha (2014) Planters Raj to Swaraj, Tulika Books

- Amalendu Guha (2015) Medieval and Early Colonial Assam: Society, Polity and Economy, Anwesha, Chapters on the geography behind the history, the historiographical perspectives, Colonisation, A big push without a take off
- Arupjyoti Saikia (2011) Forests and Ecological History of Assam, Oxford
- Arupjyoti Saikia (2019) The Unquiet River: A Biography of the Brahmaputra, Oxford
- Bela Malik (2003) The 'Problem' of Shifting Cultivation in the Garo Hills of North-East India, 1860–1970, Conservation & Society, July-December 2003, Vol. 1, No. 2 pp. 287-315
- Bhagat Oinam (2008) State of the States: Mapping India's Northeast; East-West Centre Washington Working Papers No. 12, November
- Bhagat Oinam and Dhiren ASadokpam (2018), Northeast India: A Reader, Routledge, Chapter 31 by Rohan D'Souza, Did Geography sidestep history in *Vision (2020)?*
- Census of India – decennial censuses – data for study on unit 2.
- Data of National Statistical Office and Annual Survey of Industries on Northeast East Region – various years
- David R Syiemlieh, Anuradha Dutta and Srinath Baruah (2006), Challenges of Development of North East India, Chapters 7- Flow of Central Fund and Impact on NE Economy, Chapter 8- Natural Resource Based Development Strategies, Chater 11 – Resources, Livelihood and Regulations,
- Debojyoti Das (2006) Demystifying the Myth of Shifting Cultivation: Agronomy in the Northeast
- Deepak Mishra, Vandana Upadhyaya (2017) Rethinking Economic Development in Northeast India, Routledge, Introduction: Locating North Eastern Region in a Globalising India *Deepak K. Mishra and Vandana Upadhyay,* Chapters on Economic Performance of the North-Eastern Region in the Post-Liberalisation Period; Land Laws, Development and Globalisation in Northeast India; Understanding the Sluggish Industrialisation Process in Northeast India
- Directorate of Economics and Statistics of the states of North East India, Statistical Abstracts, various years for unit 3.
- Documents on North Eastern Council, North Eastern Development Finance Corporation Limited, North Eastern Regional Agriculture Marketing Corporation etc.
- Jangkhongmang Guite (2018), Against State, Against History: Freedom, Resistance and Statelessness in Upland Northeast India, OUP
- Joyeeta Sharma (2011) Empire's Garden: Assam and the Making of India, Permanent Black
- Jutta K Dikshit and K R Dikshit (2014): North-East India: Land, People and Economy, Springer
- Kar, B. K. and Bora, A. K. (2023): Geographies of India's North-East: Some Perspectives, NEIGS and Purbayan Publication, Chapter 2 – Regional Approach to Resource Planning and Development of Assam, Chapter 9- The Role of Ecology in the Development of Geography of North-Eastern India, Chapter 15 – Physiographic Framework of North-east India, Chapter 17 – Regional Variation in Land Use and Agriculture in North-East India, Chapter 24 – Pattern of Present Population Growth and Its Impact in Assam, Chapter 31 – Patterns of Urbanization in the Peripheries of India: The Case of North- Eastern Border Region
- M Vandenhelsken, Meenaxi Barkataki- Ruscheweyh and Bengt G Karlsson, Editors (2018) Geographies of Difference: Explorations in North East Indian Studies, Routledge – chapters Introduction by B G Karlsson, Chapter 3 on Tripura By A Sen,

Chapter 6 on Large Dams and Local Communities, Chapter 7. Agrarian Changes and Politics of Autonomy, Chapter 13 Role of YMA in Mizoram

- Ministry of Agriculture and Farmers' Welfare – documents on agriculture policies and programme and agriculture statistics on the NE region.

- Ministry of Personnel Grievances and Pensions, Government of India (2005), Second Administrative Reports Commission, for Capacity Building for Conflict Resolution, Chapter 12 on Northeast India.
- Rana P Behal (2014) One Hundred Years of Servitude: Political Economy of Tea Plantations in Colonial Assam, Tulika Books
- Sajal Nag (2008) Pied Pipers in North East India: Bamboo-flowers, Rat Famine and the Politics of Philanthropy, 1881-2007, Manohar
- Sanjib Baruah (2001), Clash of resource use regimes in Colonial Assam: A nineteenth□century puzzle revisited, The Journal of Peasant Studies, 28 (3): 109-124,
- NB. Additional references to be provided during the classes

Semester VIII
Course Code: GPH24C804A
Course Name: Regional Planning and Development
Credits: 4 = 3+0+1 (L+T+P)
(Level: 400)

The course places the arguments on the need for regional planning towards achieving balanced development outcomes in a country. The students shall get introduced to the established theories of development/underdevelopment and to place critical view on the approaches of the state towards achieving the desired goals through some case studies in context of India. In addition, students will get acquainted with the policies adopted by government of India across the major sectors of the economy and approaches for inclusive development.
The students shall learn the approaches of regionalization, empirically, based on secondary data of the state surveillance systems in India; and do the analysis in statistical software using established methods. In addition, certain statistical measures used in contemporary times shall be taught to measure inequality in level of development and address specific study problems having policy relevance.

Course Outcomes:

5. Understand the development theories propagated since the last century and critically assess their relevance in contemporary contexts.
6. Learn the approaches to study development intervention through certain cases.
7. Use of development data sets
8. Application of quantitative methods to have measures on different facets of development.

Unit	Content	No. of lectures
1	The concept of region, regionalism, regionalization, and regional development	4
2	Need and purpose of regional planning: synoptic, functional and adhoc or specific	4
3	Classical/Traditional theories - Central Place Theory of Christaller, Growth Pole Theory of Perroux and Boudeville, Theory of Prebisch, Cumulative Causation Theory of Gunnar Myrdal and Multi-level Growth Foci concept of R. P. Mishra: relevance and applications	8
4	Case studies of regional planning exercises: National Capital Region, Northeast India, River basin planning- case studies from India: Key issues and relevance	6
5	Policies for development in contemporary India; Review on approaches and outcomes. Agriculture, Industrial, Public Employment policies, Policy initiatives for sustainable development; Financing development initiatives; Models for inclusive development	10
	Practical: a) Measurement of inequality in development- Gini's Coefficient and Lorenz Curve, Atkinson's Inequality measures, Hoover Index, Theil Index and General Entropy Measures; Ratios a) Construction of indicators and measures for development; Gravity potential, break point analysis, Factor Analysis and mapping	15

Suggested Readings:

- Alden J. and R. Morgan, 1974: *Regional Planning: A Comprehensive View*, Leonard Hills Books, UK
- Bellù, L. G., and Liberati, P. (2006), 'Describing Income Inequality: Theil Index and Entropy Class Indexes', Food and Agriculture Organization of the United Nations.
- Bellù, L. G., and Liberati, P. (2006), 'Policy Impacts on Inequality: Welfare Based Measures of Inequality – The Atkinson Index', Food and Agriculture Organization of the United Nations.
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- Cobham, A., Schlogl, L., and Sumner, A. (2015), 'Inequality and the Tails: The Palma Proposition and Ratio Revisited', Department of Economic and Social Affairs Working Paper No. 143 (ST/ESA/2015/DWP/143). '
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- Mishra R P, 1992: *Regional Planning: Concept, Techniques, Policies and Case Studies,*Concept Publications, New Delhi.
- NABARD (2022) Agricultural Challenges and Policies for 21st Century
- NITI Aayog (2023) Policy Paper on Indian Mode of Inclusive Development,
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- United Nations Development Programme, '2014 Human Development Trends by Indicator', available at http://hdr.undp.org/en/data.
- V Nath (1988) Regional Planning for Large Metropolitan Cities: A Study of NCR, Economic and Political Weekly, January 30
- World Bank, World Development Indicators. Accessed 13 October 2015.

Semester VIII
Course Code: GPH24C804B
Course Name: Geography of Social Wellbeing
Credits: 4 = 3+0+1 (L+T+P)
(Level: 400)

The course introduces the students to the welfare approach in Geography and its different components. The students will learn about the structure and processes of spatial distribution of social wellbeing, social justice and quality of life. Students will understand the significance of fair distribution of resources and opportunities for equality in quality of life and the need of targeted policies.

Course Outcomes:

1. Understand the key concepts of welfare approach, pattern and processes of socio-spatial justice.
2. Learn the indices of quality of life and social wellbeing.
3. Analyse determinants, indicators and policies of wellbeing and quality of life.
4. Application of Qualitative GIS in analysis.

Unit	Content	No. of lectures
1	Welfare approach in Geography: Development of the approach, key concepts – social wellbeing, quality of life, socio-spatial justice, marginal social space. Structural, economic and political processes of (in)equality, (in)justice, (un)fairness and analysis thereof with theories – Marxism and Capability approach; Sen's Endowment, Exchange Entitlement and Wellbeing	12
2	Dimensions of wellbeing – economic, health, education, social equality and inclusion, environmental, political and institutional, cultural and social cohesion, psychological and subjective wellbeing.	08
3	Determinants of quality of life – built environment, physical and mental health, education, recreation and leisure time, social belonging, freedom, law and order, environment quality; objective and subjective indicators of quality of life	05
4	Indices of measuring quality of life and social wellbeing: Human Development Index (HDI), Inequality-Adjusted HDI (IHDI), Physical Quality of Life Index (PQLI), Multidimensional Poverty Index (MDI), World Happiness Index (WHI), Gender Development Index (GDI), Gender Equality Index(GII), Human Poverty Index (HPI), Sustainable Development Goals (SDG	10
5	Public Policies – measuring benefits of public policies, measuring criteria for effective policy	05
6	Application of qualitative GIS in welfare analysis.	05

Suggested Readings:

- Bambra, Clare (2020): Health and Place, Political Economy of, International Encyclopaedia of Human Geography (2nd Edition)
- Caldarice, Ombretta (2018): Reconsidering Welfare Policies in Times of Crisis: Perspectives for European Cities, Springer
- Cope, Meghan and Elwood Sarah (2009): Qualitative GIS: A Mixed Methods Approach, Sage Publication
- Curtis, Sarah (2026): The Geography of Public Welfare Provision, Routledge
- Garnett, Ryan and Kanarghu, Pavlos (2015): Qualitative GIS: An Open Framework using SpatialLite and Open Source GIS, Transactions in GIS, 20(1)
- Harvey, David (2009, revised edition): Social Justice and the City, University of Georgia

- Lee, R and Philo, C. (2009): Welfare Geography, International Encyclopaedia of Human Geography
- Mennis, Jeremy. Mason, M. J. and Cao, Y. (2013): Qualitative GIS and the Visualization of Narrative Activity Space Data, International Journal of Geographical Information Science, vol 27, issue 2
- Pinch, Steven(1996): Worlds of Welfare: Understanding the Changing Geographies of Social Welfare Provision, Routledge
- Sen, Amartya (2010 revised edition): The Capability Approach: Concepts, Measures and Application, Cambridge university Press
- Smith, D M (1977): Human Geography: A Welfare Approach, Arnold-Heimann
- Torkelson, Erin (2026): Predatory Welfare: Debt, Race and Cash Transfer, Duke University Press
- UN: Human Development Reports, https://hdr.undp.org
- Whitworth, Adam (2020): Welfare Geography, International Encyclopaedia of Human Geography (2nd Edition)
- Wotch, J and Dear, Michael (2014): The Power of Geography: How Territory shapes Social Life, Routledge