

UNIVERSITY OF KALYANI



Syllabus for Undergraduate Programmes in Geography

**Semester – I,II,III and IV
(Revised)**

**Under Curriculum and Credit Framework for Undergraduate
Programmes (CCFUP) as per NEP, 2020**

With Effect from the Academic Session 2023-2024

Course Structure: Undergraduate Programmes in Geography

SEMESTER III							
Course Code	Course Title	Nature of Course	Credit of Course	Class hour/week	Evaluation		Total Marks
					Internal	Semester End	
GEOG-M-T-3	FUNDAMENTALS OF REMOTE SENSING, GIS AND GNSS	Major	6	6	15	60	75
GEOG-MI-T-2	HUMAN GEOGRAPHY	Minor	4	4	10	40	50
GEOG-MU-T-1	DISASTER MANAGEMENT	Multidisciplinary Course	3	3	10	35	45
GEOG-SEC-P-3	APPLICATIONS OF REMOTE SENSING AND GIS	Skill Enhancement Course	3	3	10	35	45
GEOG-VA-T-2	-	Value Added Course	4	4	10	40	50
05			20	20	55	210	265

SEMESTER IV							
Course Code	Course Title	Nature of Course	Credit of Course	Class hour/week	Evaluation		Total Marks
					Internal	Semester End	
GEOG-M-T-4	CLIMATOLOGY, SOIL AND BIOGEOGRAPHY	Major	6	6	15	60	75
GEOG-M-P-5	CARTOGRAPHIC TECHNIQUES AND SURVEYING	Major	6	6	15	60	75
GEOG-MI-T-2	HUMAN GEOGRAPHY	Minor	4	4	10	40	50
AECC-2	-	Ability Enhancement Course	4	4	10	40	50
GEOG-SI-T-2	-	Summer Internship	4	4	-	-	-
04			20	20	50	200	250

SEMESTER III

Type: Major

PAPER: III (Theory)

COURSE CODE: GEOG-M-T-3

COURSE TITLE: FUNDAMENTALS OF REMOTE SENSING, GIS AND GNSS

Total Marks: 75

Credits: 6

Course Evaluation: Semester End Examination (60 Marks) and Internal Assessment (15 Marks)

Course Objectives:

- To obtain knowledge about the fundamental concepts of remote sensing and GIS
- To study the applications of remote sensing and GIS
- To understand the principles of image interpretation
- To acquire basic knowledge about GPS and GNSS

Course Learning Outcomes:

After the completion of course, the learners will have ability to:

- understand fundamental concepts of remote sensing and GIS
- acquire basic knowledge about GPS and GNSS
- understand the principles of image interpretation
- familiar about the applications of remote sensing and GIS

Professional Skill Development Opportunities of the Course:

The obtained fundamental knowledge of this course will increase interest of the learners in Geospatial Technology. This course is highly effective in developing technical skills, digital skills, observational skills and data analysis skills of the learners. This course has a wide scope of employment opportunity.

Course Content:

UNIT I: FUNDAMENTALS OF REMOTE SENSING

1. Definition and stages of remote sensing; EMR and its spectral ranges
2. Remote sensing platforms, satellites and sensors
3. Sensor resolutions and their applications with reference to IRS and LANDSAT missions
4. Concept of FCC; Principles of image interpretation (visual and digital)
5. Aerial Photographs: types, geometry and photo interpretation keys
6. Applications of remote sensing in managing agriculture, water and forest resources;
Monitoring urban growth and environmental degradation

UNIT II: FUNDAMENTALS OF GIS AND GNSS

1. Definition, components and applications of GIS
2. GIS data structures types: spatial and non-spatial, raster and vector
3. Principles of preparing attribute tables, data manipulation and overlay analysis
4. Principles and significance of buffer preparation
5. Basic concept of GPS
6. Principles of GNSS positioning and waypoint collection; GIS- GNSS integration

Suggested Readings:

- Bhatta, B., (2021). Remote Sensing and GIS. 3rd ed, OUP India.
- Bolstad, P., (2016). GIS Fundamentals: A First Text on Geographic Information Systems. 5th ed, XanEdu Publishing Inc.
- Campbell, J. B. and Wynne, R. H., (2011). Introduction to Remote Sensing. 5th ed, Guildford Press.
- Chang, K-t., (2017). Introduction to Geographical Information System. 4th ed, McGraw-Hill Education.
- Jensen, J. R., (2005). Introductory Digital Image Processing: A Remote Sensing Perspective, Prentice Hall.
- Jensen, J.R., (2013). Remote Sensing of the Environment: An Earth Resource Perspective. Pearson Education India.
- Joseph, G. and Jegannathan, C., (2018). Fundamentals of Remote Sensing. 3rd ed, The Orient Blackswan
- Lillesand, T.M., Kiefer, R.W., Chipman, J.W., (2015). Remote Sensing and Image Interpretation. 7th ed, Wiley.
- Nag, P. and Kudrat, M., (1998). Digital Remote Sensing, Concept Publishing Company, New Delhi.
- Rees, W. G., (2012). Physical Principles of Remote Sensing, 3rd ed, Cambridge University Press.
- Wolf, P. R., Dewitt, B. A. and Wilkinson, B.E., (2014). Elements of Photogrammetry with Applications in GIS, McGraw-Hill Education

SEMESTER III

Type: Minor

PAPER: II (Theory)

COURSE CODE: GEOG-MI-T-2

COURSE TITLE: HUMAN GEOGRAPHY

Total Marks: 50

Credits: 4

Course Evaluation: Semester End Examination (40 Marks) and Internal Assessment (10 Marks)

Course Objectives:

- To acquire knowledge about the major themes of Human Geography
- To study the distribution and growth of population in India
- To study the changing nature of demographic regime
- To understand the nature of human migration and sectors of economy
- To study the types and pattern of rural settlements and functional classification of town
- To provide a comprehensive view of major ethnic groups in India
- To study the central themes in Cultural Geography and basic aspects of human development

Course Learning Outcomes:

After the completion of course, the learners will have ability to:

- understand the key themes of Human Geography
- acquire knowledge of population in India with spatio-temporal context
- understand the changing nature of population dynamics in relation to economic growth, social development and cultural change
- build concrete ideas about human migration and different economic sectors
- gain knowledge about the nature of rural and urban settlements
- acquire knowledge about ethnic identity of major ethnic groups in India
- learn to measure the progress of a country in terms of economic and social development

Professional Skill Development Opportunities of the Course:

This course will help the learners for further studies in different sub-branches of Human Geography. This course focuses on the development of critical thinking skills, analytical and data analysis skills.

Course Content:

1. Distribution and growth of population in India
2. Demographic Transition Theory
3. Migration: Concept, types and causes
4. Economic activities: Primary, Secondary and Tertiary
5. Types and patterns of rural settlements
6. Urban settlement: Census definition and characteristics
7. Functional classification of towns
8. Major ethnic groups in India: Santhal, Gond, Toda and Khasi
9. Concept of culture, Cultural hearths and Cultural diffusion
10. Human Development Index

Suggested Readings:

- Chandana, R.C. and Sidhu, M.S., (1996). Geography of Population: Concepts Determinants and Pattern, Kalyani Publishers, New Delhi
- Daniel,P.A. and Hopkinson, M.F., (1989). The Geography of Settlement, Oliver & Boyd, London.
- Haq, M., (2000). Reflections on Human Development, Oxford University Press, New Delhi
- Johnston R; Gregory D, Pratt G.etal.,(2008). The Dictionary of Human Geography,Blackwell Publication.
- Jordan et al., (2006).The Human Mosaic: A Thematic Introduction to Cultural Geography.W.H.Freemanand Company,NewYork.
- Ghosh,S., (2015). Introduction to Settlement Geography. Orient Black Swan Private Ltd., Kolkata
- Norton, W., (2006). Cultural Geography: Environments, Landscapes, Identities, Inequalities, Oxford University Press, Toronto
- Rubenstein, J.M., (2002). The Cultural Landscape, 7th edition, Prentice Hall, Englewood Cliffs
- Singh, R.Y., (2002). Geography of Settlements, Rawat Publications, Jaipur.

SEMESTER III

Type: Multidisciplinary Course

PAPER: III (Theory)

COURSE CODE: GEOG-MU-T-1

COURSE TITLE: DISASTER MANAGEMENT

Total Marks: 45

Credits: 3

Course Evaluation: Semester End Examination (35 Marks) and Internal Assessment (10 Marks)

Course Objectives:

- To acquire knowledge about basic concepts of disaster management
- To study the major natural and manmade disasters in India
- To learn disaster management strategies

Course Learning Outcomes:

After the completion of course, the learners will have ability to:

- learn the basic concepts in disaster management.
- understand the nature of natural and manmade disasters in India
- develop strategies for disaster management to sustain social development

Professional Skill Development Opportunities of the Course:

This course will help the learners in developing problem solving skills and observational skills. The acquired knowledge from this course will help the learners to develop effective strategies for management of disasters.

Course Content:

1. Definition and Concepts: Hazards, Disasters; Risk and Vulnerability; Classification of hazards
2. Flood, drought, landslide: causes, impact and distribution in India
3. Earthquake: causes, effects and seismic zones of India; Tsunami: causes and effects
4. Tropical Cyclone: structure, formation and impact with reference to India
5. Manmade disasters in India: soil erosion and accidental release of toxic chemicals – causes and impact
6. Disasters - response and mitigation measures: Institutional set up - NDMA and NIDM; Indigenous knowledge and community-based Disaster Management; Do's and Don'ts during and post disasters

Suggested Readings:

- Alexander, D., (1993). Natural Disasters, ULC Press Ltd., London.
- Collins, L.R., and Schneid, T.D., (2000). Disaster Management and Preparedness, Taylor and Francis, Florida.
- Edwards, B., (2005). Natural Hazards, Cambridge University Press, Cambridge.
- Gupta, H.K., (2010). Disaster Management, Universities Press India, Hyderabad.
- Kapur, A., (2010). Vulnerable India: A Geographical Study of Disasters, Sage Publication, New Delhi.
- Modh, S., (2010). Managing Natural Disaster: Hydrological, Marine and Geological Disasters. Macmillan, New Delhi.
- Singh, J., (2007). Disaster Management, Future Challenges and Opportunities, I.K. International Pvt. Ltd., New Delhi.
- Singh, R.B., (2005). Risk Assessment and Vulnerability Analysis, IGNOU, New Delhi.
- Singh, R.B., (2006). Natural Hazards and Disaster Management: Vulnerability and Mitigation, Rawat Publications, Jaipur.
- Sinha, A., (2001). Disaster Management: Lessons Drawn and Strategies for Future, New United Press, New Delhi
- Smith, K., (2011). Natural Hazards, Routledge, London
- Stoltman, J.P. et al., (2004). International Perspectives on Natural Disasters, Kluwer Academic Publications, Dordrecht.

SEMESTER III

Type: Skill Enhancement Course (SEC)

PAPER: III (Practical)

CODE: GEOG-SEC-P-3

COURSE TITLE: APPLICATIONS OF REMOTE SENSING AND GIS

Total Marks: 45

Credits: 3

Course Evaluation: Semester End Examination (25+10* = 35 Marks) and Internal Assessment (10 Marks)

***Laboratory Note Book + Viva-voce: 5+5 = 10**

Course Objectives:

- To develop skills in digital image processing and image interpretation
- To develop proficiency in digitization, georeferencing and preparation of annotated thematic maps
- To provide skills and expertise in remote sensing and GIS applications to solve geographical questions

Course Learning Outcomes:

After the completion of course, the learners will have ability to:

- develop expertise in digital image processing and image interpretation
- develop skills in digitization, georeferencing and preparation of annotated thematic maps
- acquire skills to solve geographical questions using remote sensing and GIS

Professional Skill Development Opportunities of the Course:

This course has the great potential to advance the learner's career. This course is highly effective to develop digital data analysis skills, observation skills, technical skills. This course has a wide variety of employment opportunities.

Course Content

1. Acquisition procedure of free geospatial data from NRSC /Bhoonidhi and USGS
2. Georeferencing of maps and images; Digitisation of features: Point, Line and Polygon
3. Data attachment and preparation of thematic map (bargraph, pie-chart and choropleth);
Overlay analysis
4. Preparation of FCC using IRS LISS-III/IV and/or LANDSAT (ETM+) data; Image enhancement
5. Preparation of LULC map by Supervised Image Classification (Maximum Likelihood) using IRS LISS-III/IV or LANDSAT (ETM+) data

[Note: Using Q-GIS (open access) software]

***A Project File of exercises consisting of each theme is to be submitted**

Suggested Readings:

- Bhatta, B., (2021). Remote Sensing and GIS. 3rd ed, OUP India.
- Bolstad, P., (2016). GIS Fundamentals: A First Text on Geographic Information Systems. 5th ed, XanEdu Publishing Inc.
- Brewer, C.A., (2015). Designing Better Maps: A Guide for GIS Users. 2nd ed, Esri Press.
- Campbell, J. B. and Wynne, R. H., (2011). Introduction to Remote Sensing. 5th ed, Guildford Press.
- Chang, K-t., (2017). Introduction to Geographical Information System. 4th ed, McGraw-Hill Education.
- Harvey, F., (2015). A Primer of GIS: Fundamental Geographic and Cartographic Concepts. 2nd ed, The Guilford Press.
- Jensen, J.R., (2013). Remote Sensing of the Environment: An Earth Resource Perspective. Pearson Education India.
- Joseph, G. and Jegannathan, C., (2018). Fundamentals of Remote Sensing. 3rd ed, The Orient Blackswan.
- Lillesand, T.M., Kiefer, R.W., Chipman, J.W., (2015). Remote Sensing and Image Interpretation. 7th ed, Wiley.

SEMESTER IV

Type: Major

PAPER: IV (Theory)

CODE: GEOG-M-T-4

COURSE TITLE: CLIMATOLOGY, SOIL AND BIOGEOGRAPHY

Total Marks: 75

Credits: 6

Course Evaluation: Semester End Examination (60 Marks) and Internal Assessment (15 Marks)

Course Objectives:

- To understand the fundamental concepts in Climatology, Soil and Biogeography
- To study the atmospheric temperature distribution, circulation, climatic classification
- To study the profile, properties and classification of soil
- To explain the Bio-geochemical cycles, biodiversity loss

Course Learning Outcomes:

After the completion of course, the learners will have ability to:

- understand fundamental knowledge in Climatology, Soil and Biogeography
- obtain adequate knowledge on the temperature distribution, heat budget, air mass, monsoon, climatic classification
- acquire comprehensive knowledge of soil profile, properties, soil classification
- understand the ecosystem, biome and biodiversity

Professional Skill Development Opportunities of the Course:

The obtained fundamental knowledge and concept of this course will increase the interest of the learners for further study and research in Climatology, Soil and Biogeography. This course is also effective in developing observational skills and critical thinking abilities of the learners.

Course Content:

UNIT I: CLIMATOLOGY

1. Temperature: Horizontal and vertical distribution; Heat budget of the atmosphere; Inversion of temperature: types and causes
2. Circulation in the Atmosphere: Planetary winds; Jet stream
3. Air mass and front: Origin, characteristics and types
4. Monsoon Circulation and Mechanism with reference to India
5. Condensation: Processes and forms; Mechanism of precipitation: Bergeron-Findeisen Theory, Collision and coalescence; Forms of precipitation
6. Concept of climate change; Climatic Classification after Köppen and Thornthwaite (1931 and 1948)

UNIT II: SOIL AND BIOGEOGRAPHY

1. Factors of soil formation; Concept of soil profile; origin and profile characteristics of Laterite, Podzol and Chernozem soils
2. Physical and chemical properties of soil: Texture, structure and moisture, pH, organic matter and NPK
3. Principles of soil classification: Genetic and USDA. Concept of land capability and its classification
4. Concepts of ecology, biosphere, ecosystem, biome, ecotone, community; Energy flow in ecosystems
5. Geographical extent and characteristic features of Tropical rain forest, Taiga and Grassland biomes
6. Bio-geochemical cycles with special reference to carbon dioxide and nitrogen; Bio-diversity: Definition, types, threats and conservation measures

Suggested Readings:

- Barry, R. G., and Carleton, A. M.(2001). Synoptic and Dynamic Climatology, Routledge, UK
- Barry, R. G., and Chorley, R. J.(1998). Atmosphere, Weather and Climate, Routledge, New York
- Critchfield, H. J.(1987). General Climatology, Prentice-Hall of India, New Delhi
- Lal, D. S.(1993). Climatology, 3rd edition, Chaitanya Pub. House, New Delhi
- 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. (2013). Climatology, Prayag Pustak Bhawan, Allahabad
- Trewartha, G. T., and Horne L. H.(1980). An Introduction to Climate, McGraw
- Biswas, T.D. and Mukherjee, S.K. (1997). Textbook of Soil Science, TataMcGraw Hill
- Bridges, E. M., (1990). World Geomorphology, Cambridge University Press, Cambridge
- Brady, N.C. and Weil, R.R. (1996). The Nature and Properties of Soil, 11th edition, Longman, London
- Floth, H.D. (1990) Fundamentals of Soil science, 8th edition, John Wiley and Sons, New York
- Chapman, J.L. and Rens, M.J. (1993).Ecology: Principle and Applications, Cambridge University Press, Cambridge
- Huggett, R. (1998). Fundamentals of Biogeography, Routledge, London
- Kormondy, E.J. (1996). Concept of Ecology, 4th edition, Prentice-Hall, India, New Delhi
- Myers, A.A. and Giller, P.S. (editors) (1998). Analytical Biogeography: an Integrated Approach to Study and Plant Distribution. Chapman and Hall, Lo

SEMESTER IV

Type: Major

PAPER: V (Practical)

CODE: GEOG-M-P-5

COURSE TITLE: CARTOGRAPHIC TECHNIQUES AND SURVEYING

Total Marks: 75

Credits: 6

Course Evaluation: Semester End Examination (50+10* = 60 Marks) and Internal Assessment (15 Marks)

***Laboratory Note Book + Viva-voce: 5+5 = 10**

Course Objectives:

- To develop knowledge and skills in Cartography and Surveying
- To develop ability and skills in drawing scales and representation of data on maps
- To enhance ability in drawing cartograms with interpretation
- To develop ability and skills in traverse surveying and determination of height of objects

Course Learning Outcomes:

After the completion of course, the learners will have ability to:

- acquire practical knowledge and skills in Cartography and Surveying
- improve skills in drawing scales and representation of data on maps
- prepare cartograms and to interpret appropriately
- develop expertise in traverse surveying and determination of height of objects

Professional Skill Development Opportunities of the Course:

The course will help the learners to build basic foundation for further studies and research in Cartography and Surveying. This course will be effective to develop analytical skills, data analysis skills, spatial analysis skills, observational skills and data visualisation skills. This course offers employment opportunities.

Course Content:

1. Construction of Scales: Linear, Comparative, Diagonal and Vernier
2. Representation of Data on Map by Proportional Circles, Dots and Spheres, Isolpleth and Choropleth methods
3. Diagrammatic Representation of Data: Bar and Age-sex Pyramid Diagram, Pie Diagram
4. Preparation and Interpretation of Climograph, Taylor Hythergraph and Ergograph
5. Measures of Concentration: Location Quotient
6. Proximity Analysis: Nearest Neighbour Analysis
7. Traversing by Prismatic Compass and Dumpy Level Surveying with One Change Point (profile drawing and contouring)
8. Determination of height of objects by Transit Theodolite (level ground base accessible case)

***A Project File of exercises consisting of each theme is to be submitted**

Suggested Readings:

- Agor, R. (1980). Textbook of Surveying and Levelling, Khanna Publishers, Delhi.
- Anson, R. and Ormelling, F. J., (1994). International Cartographic Association: Basic Cartographic Vol., Pregmen Press.
- Gupta, K. K. and Tyagi, V. C., (1992). Working with Map, Survey of India, DST, New Delhi.
- Mishra, R. P. and Ramesh, A., (1989). Fundamentals of Cartography, Concept, New Delhi.
- Monkhouse, F. J. and Wilkinson H. R., (1973). Maps and Diagrams, Methuen, London.
- Robinson, A.H., Morrison, J.L., Muehrcke, P.C., Kimerling, A.J. and Guptill, S.C. (2009). Elements of Cartography. Wiley.
- Sarkar, A., (2015). Practical Geography: A systematic approach. Orient Black Swan Private Ltd., New Delhi.
- Singh, R. L. and Singh, R. P. B., (1999). Elements of Practical Geography, Kalyani Publishers.

SEMESTER IV

Type: Minor

PAPER: II (Theory)

COURSE CODE: GEOG-MI-T-2

COURSE TITLE: HUMAN GEOGRAPHY

Total Marks: 50

Credits: 4

Course Evaluation: Semester End Examination (40 Marks) and Internal Assessment (10 Marks)

Course Objectives:

- To acquire knowledge about the major themes of Human Geography
- To study the distribution and growth of population in India
- To study the changing nature of demographic regime
- To understand the nature of human migration and sectors of economy
- To study the types and pattern of rural settlements and functional classification of town
- To provide a comprehensive view of major ethnic groups in India
- To study the central themes in Cultural Geography and basic aspects of human development

Course Learning Outcomes:

After the completion of course, the learners will have ability to:

- understand the key themes of Human Geography
- acquire knowledge of population in India with spatio-temporal context
- understand the changing nature of population dynamics in relation to economic growth, social development and cultural change
- build concrete ideas about human migration and different economic sectors
- gain knowledge about the nature of rural and urban settlements
- acquire knowledge about ethnic identity of major ethnic groups in India
- learn to measure the progress of a country in terms of economic and social development

Professional Skill Development Opportunities of the Course:

This course will help the learners for further studies in different sub-branches of Human Geography. This course focuses on the development of critical thinking skills, analytical and data analysis skills.

Course Content:

1. Distribution and growth of population in India
2. Demographic Transition Theory
3. Migration: Concept, types and causes
4. Economic activities: Primary, Secondary and Tertiary
5. Types and patterns of rural settlements
6. Urban settlement: Census definition and characteristics
7. Functional classification of towns
8. Major ethnic groups in India: Santhal, Gond, Toda and Khasi
9. Concept of culture, Cultural hearths and Cultural diffusion
10. Human Development Index

Suggested Readings:

- Chandana, R.C. and Sidhu, M.S., (1996). Geography of Population: Concepts Determinants and Pattern, Kalyani Publishers, New Delhi
- Daniel,P.A. and Hopkinson, M.F., (1989). The Geography of Settlement, Oliver & Boyd, London.
- Haq, M., (2000). Reflections on Human Development, Oxford University Press, New Delhi
- Johnston R; Gregory D, Pratt G.etal.,(2008). The Dictionary of Human Geography,Blackwell Publication.
- Jordan et al., (2006).The Human Mosaic: A Thematic Introduction to Cultural Geography.W.H.Freemanand Company,NewYork.
- Ghosh,S., (2015). Introduction to Settlement Geography. Orient Black Swan Private Ltd., Kolkata
- Norton, W., (2006). Cultural Geography: Environments, Landscapes, Identities, Inequalities, Oxford University Press, Toronto
- Rubenstein, J.M., (2002). The Cultural Landscape, 7th edition, Prentice Hall, Englewood Cliffs
- Singh, R.Y., (2002). Geography of Settlements, Rawat Publications, Jaipur.