

தமிழ்நாடு மத்தியப்  
பஸ்கலைக்கழகம்



**CENTRAL  
UNIVERSITY OF  
TAMIL NADU**

तमिलनाडु केन्द्रीय  
विश्वविद्यालय

ESTABLISHED BY

AN ACT OF PARLIAMENT IN 2009



# **M.Sc., GEOGRAPHY PROGRAMME**

## **CURRICULUM STRUCTURE**

(Academic Year 2021-2022 Onwards)

**Department of Geography  
School of Earth Sciences  
Central University of Tamil Nadu  
Thiruvarur - 610 005**

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## VISION

To be the leading Geography Department in the country and attain excellence in geography teaching and research.

## MISSION

- M1 - Provide an enhanced educational atmosphere to the students through blending of teaching and research that fosters the knowledge, skills, and experiences.
- M2 - Prepare students to solve societal problems and inspire them to become cognizant decision-makers and leaders.
- M3 - Engage local, regional, national and global communities through demand-based collaborative research.
- M4 - Establish Centre for Advanced Geographical Research with innovative techniques, instrumentation, and infrastructure.

## PROGRAMME OUTCOMES

- PO1 - Prepare students to demonstrate proficiency in theoretical and applied realms of geography.
- PO2 - Make the students understand the contemporary environmental issues and underlying cause-effect relationships.
- PO3 - Provide the ability to evaluate as well as solve geographic problems effectively through geospatial technologies.
- PO4 - Enable students to understand the spatial problems and working towards sustainable environment through both an independent and collaborative system.
- PO5 - Prepare the students to apply their skills in professional careers for their career advancement.

**PROGRAMME SPECIFIC LEARNING OUTCOMES**

After the successful completion of M.Sc., Geography, the student will be able to

- PSO1 - Explain the planet's physical processes and human interactions at varying spatio-temporal scales.
- PSO2 - Demonstrate proficiency in handling geospatial tools and techniques.
- PSO3 - Appreciate the relevance of geographical knowledge and to provide geographic insights on important societal issues.
- PSO4 - Identify current research trends within the breadth and depth of geography and produce meaningful scholarly contribution.
- PSO5 - Create community awareness and demonstrate ethics in conducting geographical research.

**GRADUATE ATTRIBUTES**

Through M.Sc., Geography, the student will be able to acquire:

- Critical thinking and observation power
- Skills to handle traditional and modern geospatial instruments
- Ability to perform spatial analysis
- Communication and teamwork skills
- Attitude to conduct scientific research projects
- Values of environmental ethics and sustainability
- Paths for self-directed and life-long learning

**PROGRAMME MAPPING****Programme Outcomes to Mission Statements**

	PO1	PO2	PO3	PO4	PO5
M1	x	x	x	x	x
M2		x	x	x	x
M3		x	x	x	x
M4	x	x	x	x	x

**Programme Specific Learning Outcomes to Programme Outcomes**

	PO1	PO2	PO3	PO4	PO5
PSO1	x	x	x	x	
PSO2	x		x		x
PSO3	x	x	x	x	x
PSO4	x	x	x	x	x
PSO5		x		x	x



## Programme Structure

Semester	Courses Offered		Credits				Assessment	
	Code	Title	L	T	P	Total	CIA	ESE
<b>First Year</b>								
I	21GEOCC1	Geomorphology	3	0	1	4	40	60
I	21GEOCC2	Population and Settlement Geography	4	0	0	4	40	60
I	21GEOCC3	Geographical Thought	4	0	0	4	40	60
I	21GEOCC4	Cartographic Techniques (Practical)	0	0	4	4	100	--
I	21GEOSEC1	Remote Sensing	3	1	0	4	40	60
I	21GEOSEC2	Geographic Information System	3	1	0	4	40	60
I		Generic Elective / MOOC	--	--	--	3	--	--
			<b>Total</b>			<b>27</b>	<b>700</b>	
II	21GEOCC5	Climatology	4	0	0	4	40	60
II	21GEOCC6	Social, Cultural and Political Geography	4	0	0	4	40	60
II	21GEOCC7	Quantitative Techniques (Practical)	0	0	3	3	100	-
II	21GEOAEC1	Geography of Health and Wellbeing	3	0	0	3	40	60
II	21GEOSEC3	GIS (Practical)	0	0	4	4	100	--
II	21GEO DSE1 21GEO DSE2 21GEO DSE3	Disaster Management Environment and Sustainable Development Advances in Remote Sensing	3	0	0	3	40	60
II	21GEO DSE4 21GEO DSE5 21GEO DSE6	Applied Geomorphology Models in Geography Urban GIS	3	0	0	3	40	60
II		Generic Elective / MOOC	--	--	--	3	--	--
			<b>Total</b>			<b>27</b>	<b>800</b>	
<b>Second Year</b>								
III	21GEOCC8	Hydrology and Oceanography	4	0	0	4	40	60
III	21GEOCC9	Geography of India	4	0	0	4	40	60
III	21GEOCC10	Regional Planning and Development	4	0	0	4	100	--
III	21GEOSEC4	Image Analysis (Practical)	0	0	4	4	100	--
III	21GEOCC11	Research and Survey Methods (Practical)	0	0	4	4	40	60
III		Generic Elective / MOOC	--	--	--	3	--	--
			<b>Total</b>			<b>23</b>	<b>600</b>	
IV	21GEOCC12	Dissertation	0	0	8	8	100	
IV	21GEOAEC2	Internship	0	2	0	2	100	
IV	21GEOAEC3	Field work	0	3	0	3	100	
			<b>Total</b>			<b>13</b>	<b>300</b>	
			<b>Grand Total</b>			<b>90</b>	<b>2400</b>	
	VAC	Academic Writing						
CC: Core Course			SEC: Skills Enhancement Course					
AECC: Ability Enhancement Compulsory Course			MOOC: Massive Open Online Course					
DSE: Discipline Specific Elective			VAC: Value Added Course					

**Note:**

- 1) In the place of Generic Elective, students can choose any course offered by the University Departments. The course should have at least three credits.
- 2) In the place of MOOC, students can pursue any course offered by SWAYAM/NPTEL in consultation with the faculty members of the Department. The course should have four credits and should be of Post-Graduate learning path. Students can transfer the marks and credits earned upon successful completion of the course.

**EVALUATION SCHEME**

The Choice-Based Credit System (CBCS) is adopted for M.Sc., Geography programme that offers flexibility to the students to choose the electives. Each course in the programme is assigned with a fixed number of credits based on the contents to be learned and it is evaluated by the course instructor(s). The evaluation of the internal component of the courses is continuous and the minimum passing mark for all the courses is 50%.

**Evaluation of Theory Courses**

All theory courses shall carry a Continuous Internal Assessment (CIA) component to the extent of 40 marks and End Semester Examination (ESE) for 60 marks.

Components	Weightage (%)
<b>Internal Exams (Best 2 of 3)</b>	20
<b>Assignments / Case Studies</b>	10
<b>Seminar</b>	05
<b>Interaction</b>	05
<b>End Semester Exams</b>	60

Students failing to put 75% of attendance in any course/s will not be allowed to write ESE. For other conditions, the University's regulations will be governed. They have to redo the course/s only when it is offered next time and to fulfil the attendance criteria to appear for ESE in that course.

**Evaluation of Laboratory Courses**

The Continuous Internal Assessment (CIA) will be the only component for Laboratory Courses. No separate examinations will be conducted.

Components	Weightage (%)
<b>Lab Exercises</b>	60
<b>Assignments / Case Studies</b>	20
<b>Interaction</b>	10
<b>Submission of Record</b>	10

Students failing to put in 75% of attendance in laboratory courses have to redo the course only when it is offered next time. For other conditions, the University's regulations will be governed.

**Evaluation of Dissertation / Internship / Field Work**

The thesis/report will be supervised and assessed by internal members. Students must present their thesis/report in a viva-voce which will be conducted at the end of the programme duration.

Components	Weightage (%)	
	Dissertation	Internship/Field Work
<b>Regular interactions with the supervisor</b>	20	20
<b>Statement of the problem and methods adopted</b>	20	--
<b>Outputs and scientific merits</b>	20	30
<b>Structure of thesis/report</b>	20	20
<b>Viva-voce</b>	20	30



**END SEMESTER EXAMINATION – QUESTION PAPER PATTERN**

**Programme:** M.Sc. Geography

**Duration:** 3 Hours

**Course Code:** XXX

**Maximum Marks:** 60

**Course Title:** XXX

**Date:** XXX

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**Section-A [5 X 2 = 10 Marks]**

*Answer ALL Questions not exceeding 100 words each*

*All the questions to be asked here under are definition or short types to test the students' remembrance and understanding of domains*

- 1.
- 2.
- 3.
- 4.
- 5.

**Section-B [4 X 5 = 20 Marks]**

*Answer any FOUR Questions not exceeding one page each*

*All the questions to be asked hereunder are paragraph types. At least one question will be asked from each unit. One or two question(s) will be asked each to test the students' ability to understand, apply, analyse, evaluate, and creative cognitive domains*

- 6.
- 7.
- 8.
- 9.
- 10.
- 11.

**Section-C [2 X 15 = 30 Marks]**

*Answer any TWO Questions not exceeding five pages each*

*All the questions to be asked hereunder are essay types. One or two question(s) will be asked each to test the students' ability to analyse, evaluate, and creative cognitive domains*

- 12.
- 13.
- 14.
- 15.



## Syllabus

# SEMESTER - I



Credits: 4

Course Code: 21GEOCC1

## **GEOMORPHOLOGY**

### ***Learning Outcomes***

*Upon completing this course, the students will be able to:*

1. *understand the physical earth systems and controls of geomorphic processes.*
2. *describe the exogenic and endogenic processes and their importance in landform development.*
3. *prepare geomorphology maps and apply the geomorphology skills in geographical research.*

### **Unit I**

Geological time scale - Evolution of geomorphic ideas – Fundamental concepts in geomorphology

### **Unit II**

Internal structure and Isostasy - Plate tectonics - Tectonic and structural landforms - Volcanoes and earthquakes

### **Unit III**

Weathering, soil processes, and mass movement - Fluvial landforms and Fluvial geomorphic cycle - Slope development theories - Aeolian landforms and Arid cycle

### **Unit IV**

Glacial processes and glacio-fluvial landscapes - Karst landscapes - Geomorphology of coasts - Morphogenetic regions – Dynamic equilibrium in geomorphology

Field trips will be arranged to recognize landforms and to understand geomorphic data collection methods.





**References:**

1. Bierman, P. R. and Montgomery, D. R., (2014): Key concepts in geomorphology, Freeman and Company Publishers.
2. Bloom, A.L., (1978): Geomorphology: A systematic analysis of late Cenozoic land forms, Prentice-Hall
3. Christopherson, R. W. and Birkeland, G. H., (2012): Geosystems: An Introduction to Physical Geography (8th edition), Pearson Education
4. Huggett, R. J., (2007): Fundamentals of Geomorphology, Routledge.
5. Kale, V. and Gupta, A. (2018): Introduction to Geomorphology, Orient Black Swan
6. Lobeck A. K. (1939): Geomorphology, McGraw-Hill Company.
7. Mc Geary, D. and Plummer, C. C., (1994): Earth Revealed, W. C. B. Publishers.
8. Small, R.J., (1972): The Study of landforms: A textbook of geomorphology, Cambridge University Press
9. Ritter, D.F., Kochel, R.C. and Miller, J.R., (2002): Process Geomorphology, Waveland Press.
10. Singh, S., (2019): Geomorphology, Pravalika Publications
11. Strahler, A. H. and Strahler, A N., (2001): Modern Physical Geography (4/E), John Wiley and Sons, Inc.
12. Summerfield M.A., (2013): Global Geomorphology, Routledge.
13. Thornbury, W. D., (2019): Principles of Geomorphology, Third Edition, New Age International Publishers.
14. Von Engel, O.D., (1957): Geomorphology, The Macmillan Company
15. Waugh D., (2005) Geography: An Integrated Approach, Nelson

**Mapping of Program Outcomes with Course Outcomes**

	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>
<b>CO1</b>	x				
<b>CO2</b>		x		x	
<b>CO3</b>			x	x	x



Credits: 4

Course Code: 21GEOCC2

## **POPULATION AND SETTLEMENT GEOGRAPHY**

### ***Learning Outcomes***

*Upon completing this course, the students will be able to:*

1. *get the knowledge of human aspects of geography.*
2. *learn concepts of population geography, settlement geography, economic geography, and contemporary issues that are relevant in the present context.*
3. *think in spatial terms to explain what has occurred in the past as well as using geographic principles to understand the present and plan for the future.*

### **Unit I**

**Population Geography** – Sources of Data with reference to India; Population Size, Distribution and Growth – Spatial Patterns; Population Dynamics: Fertility, Mortality and Migration – Measures, Determinants and Implications.

### **Unit II**

**Settlement Geography** - Types of Rural Settlements; Classification of Urban Settlements; Trends and Patterns of Urbanization, Concept of Primate City and Rank size Rule

### **Unit III**

**Models, Theories and Laws:** Urban land use models – CZM, Sector Model, Multiple Nuclei Model, Theories of Growth – Malthusian theory - Demographic Transition models - Theory of Christaller's CPT, Law of Migration

### **Unit IV**

**Contemporary Issues:** Age Sex Pyramids and Aging of population - Declining sex ratio – Demographic transition in India



### References:

1. Barrett H. R., (1995): Population Geography, Oliver and Boyd.
2. Bhende A. and Kanitkar T., (2000): Principles of Population Studies, Himalaya Publishing House.
3. Chandna, R.C., (2010): Population Geography, Kalyani Publisher.
4. Clarke J. I., (1965): Population Geography, Pergamon Press, Oxford.
5. Daniel, P.A. and Hopkinson, M.F., (1989) The Geography of Settlement, Oliver & Boyd.
6. Harvey, D. (1996) Justice, Nature and Geography of Difference, Blackwell Publishers, Cambridge.
7. Hassan, M.I. (2005): Population Geography, Rawat Publications, Jaipur.
8. Johnston R; Gregory D, Pratt G. et al., (2008): The Dictionary of Human Geography, Blackwell Publication.
9. Jones, H. R., (2000): Population Geography, 3rd ed. Paul Chapman.
10. Johnston, R. J., (1991): A Question of Place: Exploring the Practice of Human Geography. Blackwell Publishers.
11. Johnston R; Gregory D, Pratt G. et al. (2008): The Dictionary of Human Geography, Blackwell Publication.
12. Lutz W., Warren C. S. and Scherbov S., (2004): The End of the World Population Growth in the 21st Century, Earthscan.
13. Massey, D., Allen, J., and Sarre, P., (1999): Human Geography today, Blackwell Publishers, Cambridge.
14. Newbold K. B., (2009): Population Geography: Tools and Issues, Rowman and Littlefield Publishers.
15. Pacione M., (1986): Population Geography: Progress and Prospect, Taylor and Francis.
16. Singh, R.Y., (2000): Geography of Settlements, Rawat Publication.

### Mapping of Program Outcomes with Course Outcomes

	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>
<b>CO1</b>	x				
<b>CO2</b>	x	x			
<b>CO3</b>	x			x	x



Credits: 4

Course Code: 21GEOCC3

## **GEOGRAPHICAL THOUGHT**

### ***Learning Outcomes***

*Upon completing this course, the students will be able to:*

- 1. get an insight into the historical evolution of the subject of geography. It will help in creating the philosophical foundation of the subject.*
- 2. understand contemporary modern views incorporated will inculcate critical thinking.*
- 3. develop both inductive and deductive reasoning to attain holistic thinking about geographic systems.*

### **Unit I**

Evolution of Geographic Thought: Changing Paradigms in Geography: Environmentalism, Possibilism, Areal differentiation, spatial organization

### **Unit II**

Pre-Modern – Early Origins of Geographical Thinking with reference to the Classical and Medieval Philosophies (Greek, Roman and Arab Geographers)

### **Unit III**

Modern – Evolution of Geographical Thinking and Disciplinary Trends in Germany, France, Britain, United States of America

Indian Geography: Evolution of Geography in India, Progress and Contributions in Indian Geography, Life and works of Indian Geographers, Geographical Societies

### **Unit IV**

Philosophical Debates in Contemporary Geography: Dichotomy between Environmental Determinism and Possibilism, Systematic and Regional, Digital vs. Analog

Recent Trends - Quantitative Revolution and its impact, Behaviouralism, Critical understanding of positivism, Marxism, and Postmodernism - welfare approach



**References:**

1. Bhat, L.S., (2009): Geography in India (Selected Themes), Pearson
2. Black, J., (2003). Visions of the World: A History of Maps, Mitchell Beazley.
3. Bonnett A., (2008): What is Geography? Sage.
4. Cresswell, T., (2013). Geographic Thought: A Critical Introduction, Wiley-Blackwell.
5. Dikshit R. D., (1997): Geographical Thought: A Contextual History of Ideas, Prentice–Hall India.
6. Haggett, P., and A. D. Cliff and Frey (1977): Locational Analysis in Human Geography.
7. Hartshorne R., (1959): Perspectives of Nature of Geography, Rand Mac Nally and Co.
8. Harvey, D., (1969): Explanation in Geography. Edward Arnold Publishers Ltd.
9. Holt-Jensen A., (2011): Geography: History and Concepts: A Students Guide, SAGE.
10. Johnston R. J., (Ed.): Dictionary of Human Geography, Routledge.
11. Martin Geoffrey J., (2005): All Possible Worlds: A History of Geographical Ideas, Oxford.
12. Siddhartha K, and Mukherjee S., (2016): A Modern Dictionary of Geography, Kitab Mahal.
13. Singh, R. B., (2016): Progress in Indian Geography, Indian National Science Academy.
14. Soja, Edward (1989): Post-modern Geographies, Verso, London. Reprinted 1997: Rawat Publications.

**Mapping of Program Outcomes with Course Outcomes**

	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>
<b>CO1</b>	x	x			
<b>CO2</b>	x	x			
<b>CO3</b>	x	x			



Credits: 4

Course Code: 21GEOCC4

## CARTOGRAPHIC TECHNIQUES - PRACTICAL

### ***Learning Outcomes***

*Upon completing this course, the students will be able to:*

- 1. develop the basic skills of mapmaking and map interpretation*
- 2. acquire knowledge about scale, projections, topographical maps, and slope analysis.*
- 3. represent geographic data as well as analyse information from a spatio-temporal perspective.*

### **Unit I**

Cartography – Historical evolution, Maps – Classification and Types (Tangible and mental maps), Thematic Maps; Mapping Process

### **Unit II**

Topographical maps: Referencing System - ITRF, Interpretation of Topographical maps

### **Unit III**

Map Projections – Classification, Properties and Uses; Graphical Construction of Polar Zenithal Stereographic, Bonne's and Mercator's Projections, LCC, UTM. Projections for images, Datum.

### **Unit IV**

Principles of Map Design – legibility, visual and line contrast, texture, value, colour, visual hierarchy, balance. Elements of the map – Mapped area, inset, title and sub-title, legend, data source, scale and orientation. Map Symbolology, Generalization and Compilation.

**Practical Record:** A Project File in pencil, comprising one exercise each on projections, topographical sheet interpretation.



**References:**

1. Anson R. and Ormelling F. J., (1994): International Cartographic Association: Basic Cartographic, Pregmen Press.
2. Gupta K.K. and Tyagi, V. C., (1992): Working with Map, Survey of India, DST.
3. Kennedy, M., Kopp, S., (2001): Understanding Map Projections, ESRI Press.
4. Kimerling, A.J., Buckley, A.R., Muehrcke, P.C., Muehrcke, J.O., (2011): Map Use: Reading, Analysis, Interpretation, 7th Edition, ESRI Press.
5. Mishra, R.P., (2014): Fundamentals of Cartography (Second Revised and Enlarged Edition), Concept publication.
6. Mishra R.P. and Ramesh, A., (1989): Fundamentals of Cartography, Concept.
7. Monkhouse F. J. and Wilkinson H. R., (1973): Maps and Diagrams, Methuen.
8. Pearson II, F., (1990): Map Projections: Theory and Applications 2nd Edition, CRC Press.
9. Rhind D. W. and Taylor D. R. F., (Eds.) (1989): Cartography: Past, Present and Future, Elsevier, International Cartographic Association.
10. Robinson A. H., (2009): Elements of Cartography, John Wiley and Sons.
11. Sarkar, A., (2015): Practical geography: A systematic approach. Orient Black Swan Private Ltd.
12. Sharma J. P., (2010): Prayogic Bhugol, Rastogi Publishers.
13. Singh, R. L., Singh, R. P. B., (2008): Elements of Practical Geography, Kalyani Publishers.
14. Vaidyanadhan, R., Subbarao, K.V., (2014): Landforms of India from Topomaps and Images, Geological Society of India.

**Websites:**

- Geological Survey of India: [www.gsi.gov.in](http://www.gsi.gov.in)
- Indian National Cartographic Association: [www.incaindia.org](http://www.incaindia.org)
- Indian Naval Hydrographic Department: [www.hydrobharat.nic.in](http://www.hydrobharat.nic.in)
- National Bureau of Soil Survey and Land Use planning: [www.nbsslup.in](http://www.nbsslup.in)
- Survey of India: [www.surveyofindia.gov.in](http://www.surveyofindia.gov.in)

**Mapping of Program Outcomes with Course Outcomes**

	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>
<b>CO1</b>	x		x		x
<b>CO2</b>					
<b>CO3</b>	x		x	x	x



Credits: 4

Course Code: 21GEOSEC1

## **REMOTE SENSING**

### ***Learning Outcomes***

*Upon completing this course, the students will be able to:*

- 1. understand basic concepts of electromagnetic radiation, its interaction with the earth's surface and atmosphere.*
- 2. understand resolution properties to interpret, process, and evaluate remotely sensed images.*
- 3. identify specific applications where remote processing may be used as a tool for monitoring.*
- 4. apply knowledge of image processing principles strategically to new problems.*

### **Unit I**

Introduction to Remote Sensing: Concepts, Components, Electro Magnetic Radiation & Spectrum, Theories of EMR; Types of Remote Sensing: Based on Energy source and Electro-Magnetic Spectrum.

### **Unit II**

Energy Interaction with Atmosphere & Earth Surface: Reflection, Absorption, Transmission, Scattering: Rayleigh, Mie and Non-selective; Absorption, and Refraction; Atmospheric Windows. Spectral Signature: Interaction with soil, water and vegetation, and other features;

### **Unit III**

Platforms, Sensors, Orbits: Types of platform, Types of sensors: FOV, IFOV, Active and Passive, Satellite orbits, Resolution and its types: Spatial, Spectral, Radiometric, and Temporal.

### **Unit IV**

Image Colour Composites: False Colour Composite; Natural Colour Composite; Vegetation Indices; Elements of Image Interpretation. Remote Sensing Data Products: Legacy and Recent Developments.

Project: Image interpretation and applications





**References:**

1. Lillesand, T. M., Kiefer, R. W., and Chipman, J. W., (2008): Remote Sensing and Image Interpretation, John Wiley & Sons
2. Jensen, J. R., (2005): Introductory Digital Image Processing, Prentice Hall
3. Jensen, J. R., (2004): Remote Sensing of the Environment: An Earth Resource Perspective, Pearson Education.
4. Reddy, A. M., (2008): Textbook of Remote Sensing and Geographic Information System, B.S. Publication.
5. Campbell, J., (2002): Introduction to Remote Sensing, Taylor & Francis.
6. Curran, P. J., (1985): Principles of Remote Sensing, Longman.
7. Drury, S. A., (2001): Image Interpretation in Geology, Blackwell.
8. Kerle, N., Janssen, L. L. F., and Huurneman, G. C. (Eds.) (2004): Principles of Remote Sensing – An Introductory Textbook, The International Institute for Geo-Information Science and Earth Observation (ITC).
9. Joseph, G., (2004): Fundamentals of Remote Sensing, Universities Press.
10. Rees, W. G., (2012): Physical Principles of Remote Sensing, Cambridge University Press.
11. Konecny G., (2014): Geoinformation: Remote Sensing, Photogrammetry, and Geographic Information Systems (2<sup>nd</sup> Edition), CRC Press.
12. Sabins, Floyd F. Jr., (1997): Remote Sensing: Principles and Interpretation, W.H. Freeman and Co. Ltd.
13. Singh, R.B. (ed.), (1991): Environmental Monitoring: Application of Remote Sensing and GIS, Geocarto Int. Centre.
14. Singh, R.B. and Murai, S. (Eds.), (1998): Space Informatics for Sustainable Development, Oxford and IBH Publications.
15. Cracknell A. P., (2018): The development of remote sensing in the last 40 years, International Journal of Remote Sensing, 39:23, 8387-8427.

**Mapping of Program Outcomes with Course Outcomes**

	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>
<b>CO1</b>	x				
<b>CO2</b>	x		x		
<b>CO3</b>		x	x	x	x
<b>CO4</b>		x	x	x	x



Credits: 4

Course Code: 21GEOSEC2

## **GEOGRAPHIC INFORMATION SYSTEM**

### ***Learning Outcomes***

*Upon completing this course, the students will be able to:*

1. *understand the fundamental concepts of geographic information systems.*
2. *use standard GIS software for conducting basic GIS analyses and producing map output.*
3. *design and develop research projects involving geospatial processes and data.*

### **Unit I**

Introduction to GIS: Definition, and Elements of GIS; Spatial Data and its organization, Components, Spatial Data Infrastructure; Development of GIS technology; theoretical models and framework for GIS, representation of geographic data.

### **Unit II**

Coordinate systems, Datum, Scale, Resolution, Map projection; Data Input, Storage and Editing; Nature of geographic data: Spatial and Attribute Digitization; GIS databases - Storage and manipulation; Data Quality – Errors in geospatial data, Accuracy and Precision.

### **Unit III**

Concept of vector and raster based models; Tessellations, Topology – Elements, Planar and Non-Planar topology; Geodatabase – Components and types; Representation of composite features, DEM, Raster Data Structure, Compression and Conversion.

### **Unit IV**

Basic Spatial Analysis: Spatial Queries, Map algebra, Neighbourhood analysis; Proximity analysis and buffers; Overlays Analysis – raster and vector based overlay and their applications; Interpolation, Presentation of GIS output.

***Practical Report:*** Prepare a report consisting of five exercises on using any GIS Software on above mentioned themes.



**References:**

1. Burrough, P.A., and McDonnell, R.A., (1998): Principles of Geographic Information Systems, Oxford University Press.
2. Chang, K. T., (2006): Introduction to Geographic Information Systems, Tata McGraw-Hill.
3. De Mers, Michael N., (1999): Fundamentals of Geographic Information Systems, John Wiley & Sons.
4. Environmental Systems Research Institute (ESRI), (1997): Getting to know Arc View GIS, Cambridge: Geoinformation International.
5. Heywood, I. et al., (2004): An Introduction to Geographic Information Systems, Pearson Education.
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**Mapping of Program Outcomes with Course Outcomes**

	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>
<b>CO1</b>	x				x
<b>CO2</b>			x		x
<b>CO3</b>			x	x	x



# **SEMESTER – II**



Credits: 4

Course Code: 21GEOCC5

## **CLIMATOLOGY**

### ***Learning Outcomes***

*Upon completing this course, the students will able to:*

1. *understand the basic concepts and provide essential background for further studies in weather and climate.*
2. *explain the weather patterns, causes of atmospheric instability and disturbances, and climate variability.*
3. *analyse atmospheric circulation systems as well as their interconnections and driving forces.*

### **Unit I**

Introduction to Climatology: Atmospheric composition, mass and structure - Solar radiation and the global energy budget - Atmospheric moisture budget: humidity, evaporation, condensation and precipitation.

### **Unit II**

Atmospheric Instability: adiabatic temperature changes, condensation level, air stability and instability - Cloud formation - Precipitation processes – Thunderstorms.

### **Unit III**

Atmospheric motion: principles and local winds - Global pressure and wind belts - General Circulation - Ocean structure and circulation - Atmospheric general circulation models.

### **Unit IV**

Tropical systems: Inter-tropical convergence, tropical disturbances and Asian monsoon - Mid-latitude Systems: air masses - frontogenesis and frontal characteristics and Mesoscale convective systems - Climate classification (Koppen and Thornthwaite) - Climatic change.



**References:**

1. Barry, R.G. & Chorley, R.J., (2003): Atmosphere, Weather and Climate, 11<sup>th</sup> Edition, Routledge Publications.
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**Mapping of Program Outcomes with Course Outcomes**

	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>
<b>CO1</b>	x	x			
<b>CO2</b>		x			x
<b>CO3</b>		x	x		x



Credits: 4

Course Code: 21GEOCC6

## **SOCIAL, CULTURAL AND POLITICAL GEOGRAPHY**

### ***Learning Outcomes***

*Upon completing this course, the students will able to:*

- 1. understand human values, social ethics, welfare, wellbeing, inclusion & exclusion and other important concepts*
- 2. identify the neutrality in social and cultural issues and demonstrate sense of appreciation and respect for the diversity of perspectives, world-views, and cultures*
- 3. explain the evolution and emergence of Nation State by tracing the changes in politics over time and geopolitics based on the struggle for resources and power*

### **Unit I**

Social Geography: Nature and Scope - Concept of Social Space: First, Second and third Space; Geographies of Welfare and Wellbeing - Concept of Social wellbeing, Human Development Index, Social Geographies of Inclusion and Exclusion: Slums, Gated Communities with special reference to India.

### **Unit II**

Cultural Geography: Nature and Scope; Concept of Culture; Cultural Theory; Cultural Landscape, Integration and Globalisation of Culture - Cultural regions of India: Defining Caste, Class, Religion, Gender, Language and their Spatial Underpinnings with reference to India

### **Unit III**

Political Geography: Nature, Scope and Development; Concept of Nation and State, Attributes of State – Federalism and Multilevel Governance - Geography of Resource Conflicts – Politics of displacement.



**References:**

1. Ahmed, A., (1999): Social Geography, Rawat Publications.
2. Casino, V. J. D., Jr., (2009) Social Geography: A Critical Introduction, Wiley Blackwell.
3. Cater, J. and Jones, T., (2000): Social Geography: An Introduction to Contemporary Issues, Hodder Arnold.
4. Panelli R., (2004): Social Geographies: From Difference to Action, Sage.
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7. Sopher, D., (1980): An Exploration of India, Cornell University Press.
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**Mapping of Program Outcomes with Course Outcomes**

	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>
<b>CO1</b>	x	x		x	
<b>CO2</b>		x	x	x	
<b>CO3</b>	x	x		x	
<b>CO4</b>	x	x		x	





Credits: 3

Course Code: 21GEOCC7

## **QUANTITATIVE TECHNIQUES - PRACTICAL**

### ***Learning Outcomes***

*Upon completing this course, the students will be able to:*

1. *acquaint themselves with the distinctiveness of quantitative techniques in geography.*
2. *gain knowledge about frequency distribution, uni-variate, bi-variate, and multi-variate analysis*
3. *understand software tools such as MS Excel, SPSS etc. which are essential for the analysis of spatial statistics.*
4. *identify specific statistical techniques where they can be used for data analysis.*

### **Unit I**

***Introduction to statistical Techniques and Uni-variate analysis:*** Frequency Distribution, types, Measures of Central Tendency, Measures of Dispersion, Skewness, and Kurtosis.

### **Unit II**

***Bi-Variate and Multi-Variate Analysis:*** Correlation – Karl Pearson's Correlation coefficient, Spearman's Rank Correlation, Multiple Correlation, Regression Analysis, Multiple Regressions, Regression residuals, Measures of Inequality: Lorenz curve and Gini's coefficient.

### **Unit III**

***Statistical Test of Significance:*** Introduction to hypothesis testing, 't' test, 'f' test, z test, sign test, Chi square ( $X^2$ ) test, and ANOVA test.

### **Unit IV**

***Introduction to Statistical Software:*** MS Excel, SPSS; Geographic Data Entry, Storing and Retrieving Data Files, Data File Handling, Generating New Variables, Running Statistical Procedures, Constructing Graphical Displays, Output Viewer.



**References:**

1. James, E. B., and Barber, G. M., (1996): Elementary Statistics for Geographers, the Guilford Press.
2. Cressie, N. A. C., (1991): Statistics for Spatial Analysis, Wiley.
3. Eldon, D., (1983): Statistics in Geography: A Practical Approach, Blackwell.
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**Mapping of Program Outcomes with Course Outcomes**

	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>
<b>CO1</b>	X				x
<b>CO2</b>	X				x
<b>CO3</b>					x
<b>CO4</b>	X		x		x



Credits: 3

Course Code: 21GEOAECC1

## **GEOGRAPHY OF HEALTH AND WELLBEING**

### ***Learning Outcomes***

*Upon completing this course, the students will be able to:*

1. *generate awareness about the driving forces of health and wellbeing.*
2. *develop linkages between the spatial pattern of the disease with geographical parameters and present policy measures to reduce it.*
3. *explain the relationships among housing, lifestyle, occupation, environment, and health*
4. *identify linkages between global environmental change, microclimate, heat and cold wave, and human health.*

### **Unit I**

Perspectives on Health: Definition; evolution of health geography; Health and happiness; driving forces in health; approaches to geography of health; Measures of health; ICSU programme on health and wellbeing in changing urban environment - a system approach.

### **Unit II**

Global Burden of Diseases: Regional patterns of communicable, non-communicable and infectious diseases in India, Epidemiological transition model; Epidemiological transition in India

### **Unit III**

Exposure and Health Risks: Air pollution; household waste; water; housing; workplace, lifestyle related diseases; Geographical understanding of epidemics; Climate Change and Human Health

### **Unit IV**

Remote Sensing, GIS and Health: Spatial Techniques Useful in the Study of Health, Prospects and Challenges of using GIS in Healthcare



**References:**

1. Akhtar, R., (Ed.), (1990): Environment and Health Themes in Medical Geography, Ashish Publishing House.
2. Meade, M., and Emch, A., (2010): Medical Geography, 3<sup>rd</sup> Edition, Guilford Press.
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4. Bradley, D., (1977): Water, Wastes and Health in Hot Climates, John Wiley.
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6. Cliff, A. D. and Peter, H., (1988): Atlas of Disease Distributions, Blackwell Publishers, Oxford.
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15. Tromp, S., (1980): Biometeorology: The Impact of Weather and Climate on Humans and their Environment, Heydon and Son.

**Websites**

<http://www.healthdata.org/gbd/2019>; <https://www.mygov.in/covid-19>;  
<https://www.who.int/> ; <https://web.iitd.ac.in/~sagnik/Lancet2017.pdf>

**Mapping of Program Outcomes with Course Outcomes**

	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>
<b>CO1</b>	x	x			
<b>CO2</b>		x			
<b>CO3</b>		x			
<b>CO4</b>		x		x	x



Credits: 4

Course Code: 21GEOSEC3

## **GIS - PRACTICAL**

### ***Learning Outcomes***

Upon completing this course, the students will be able to:

1. *understand the scale, projection, and coordinate systems, appropriate use of vector and raster data structures and basics of data capture, storage, analysis, and output in a GIS.*
2. *use GIS software to do georeferencing, digitization, symbolization, layout of map and spatial analysis.*
3. *critically think and evaluate the physical, social, and environment-related research problems through the acquired geospatial practical knowledge.*
4. *acquire GIS practical skills which is helpful for them to fetch good employment opportunities.*

### **Ex. 1: Structuring geographic data**

- Building Geodatabase
- Create feature class
- Adding fields and domains

### **Ex. 2: Explore spatial and attribute data**

- Exploring vector and raster data formats
- Web map service
- Assign Primary key and foreign key
- Exploring Field calculator and Feature geometry tools

### **Ex. 3: Spatial referencing**

- Change a projection
- Set-up a custom coordinate system
- Coordinate transformations
- Georeference a raster image

### **Ex. 4: Digitizing and editing geographic data**

- Digitize point, line and polygon features
- Use advanced edit tools
- Spatially adjust features

### **Ex. 5: Joining and relating tables**

- Joining the attributes from a table
- Relating Tables
- Aggregate spatial and attribute data

### **Ex. 6: Spatial interpolation**

- Thiessen Polygons
- IDW
- Kriging



**Ex. 7: Vector analysis**

- Spatial Vector operations (Extract, Overlay, Proximity, Generalization)
- Model Builder

**Ex. 8: Raster analysis**

- Local Operations
- Focal Operations
- Raster calculator

**Ex. 9: Map symbolization and layouting**

- Symbolizing geographic data
- Create choropleth maps
- Create point maps
- Create map layouts
- 3D Visualization

**Ex. 10: Spatial data publishing**

- Web GIS Services
- Exploring Bhuvan
- Publish the spatial data using ArcGIS Server

**References:**

1. Chang, K. T., (2006): Introduction to Geographic Information Systems. 3<sup>rd</sup> Edition, McGraw Hill.
2. Willpen L. G., and Kurland, K. S., (2011): GIS Tutorial 1: Basic Workbook for ArcGIS10, ESRI Press.
3. Allen, D. W., (2011): GIS Tutorial 2: Spatial Analysis Workbook for ArcGIS10, ESRI Press.
4. Allen D. W., and Coffey, J. M., (2011): GIS Tutorial 3: Advanced Workbook for ArcGIS10, ESRI Press.
5. Mitchell, A., (1999): GIS Analysis – Volume 1: Geographic Patterns and Relationships, ESRI Press.
6. Mitchell, A., (2009): GIS Analysis – Volume 2: Spatial measurements and Statistics, ESRI Press.

**Mapping of Program Outcomes with Course Outcomes**

	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>
<b>CO1</b>	x		x		x
<b>CO2</b>			x		x
<b>CO3</b>		x	x		x
<b>CO4</b>			x		x



Credits: 3

Course Code: 21GEODSE1

## **DISASTERS MANAGEMENT**

### ***Learning Outcomes***

*Upon completing this course, the students will be able to:*

1. *learn about public health emergency preparedness and response.*
2. *acquire basic public health skills and knowledge in epidemiology to explore surveillance, mitigation, preparedness, response and recovery from natural and human-caused emergency events.*
3. *explain medical and health management of disasters in pre, during and post disaster situation.*
4. *identify gaps in preparedness system and suggest methods for improvement within realistic time and resource constraints.*

### ***Unit I: Understanding Disaster Management***

Definition, Types, Disaster management Cycle, Overview of impact of disasters (natural and human induced) on human health: Death toll, injury and emergency; Population Exposure model.

### ***Unit II: Prevention and Preparedness Stages of Disaster Management***

Prevention of risk: training, education, role of media, vector control, sanitation, hygiene, immunization, availability and accessibility to health services, emergency warning system; Preparedness and planning: Medical Preparedness Plan preparation, Health communication, Mock drills.

### ***Unit III: Response and Rehabilitation Stages of Disaster Management***

Disaster response and reactions as a risk; Rehabilitation and recovery: Food safety, safe drinking water, hygiene, sanitation, control of communicable diseases; Post-Trauma Stress Management: Symptoms of stress, Psychological interventions and activities.

### ***Unit IV: Role of ICT, Remote sensing and GIS in improving human health managing disasters***

Role of internet, crowd sourcing, social media, remote sensing and GIS in improving human health in pre, post and during disasters; Case study of two recent disaster events assessing the status of loss of human health, efforts to restore the situation.



**References:**

1. Clements, B. W., (2009): Disasters and Public Health: Planning and Response, Elsevier Inc.
2. Dunkan, K., and Brebbia, C. A., (Eds.) (2009): Disaster Management and Human Health Risk: Reducing Risk, Improving Outcomes, WIT Press, UK.
3. Government of India, (1997): Vulnerability Atlas of India, Revised Ed., Building Materials & Technology Promotion Council, Ministry of Urban Development.
4. Louisa, R. B., Bradley, M. et al., (2000): Remote Sensing and Human Health: New Sensors and New Opportunities in Perspective, 6 (3).
5. Mac Mohan, B., and Trichopoulos, D., (1996): Epidemiology – Principles and Methods, Little Brown and Co.
6. Nelson, C., Lurie, N., Wasserman, J., Zakowski, S., (2007): Conceptualizing and Defining Public Health Emergency Preparedness, Am J Public Health, DOI: AJPH.2007.114496.
7. Noji, E. K., (1997): The Public Health Consequence of Disasters, OUP.
8. Persad, G., Wertheimer, A., and Emanuel, E. J., (2009): Principles for allocation of scarce medical interventions, Lancet, 373(9661):423-431. DOI: 10.1016/S0140-6736(09)60137-9.
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12. Wulff, K., Donato, D., and Lurie, N., (2015): What is health resilience and how can we build it? Annual Rev Public Health, 36: 361-374, DOI: 10.1146/annurev-publhealth-031914-122829.

**Web References**

helid.disasters.net  
paho.org  
nidm.nic.in  
mohfw.nic.in

**Mapping of Program Outcomes with Course Outcomes**

	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>
<b>CO1</b>	x	x		x	
<b>CO2</b>		x		x	x
<b>CO3</b>		x		x	
<b>CO4</b>	x	x		x	x





Credits: 3

Course Code: 21GEODSE2

## **ENVIRONMENT AND SUSTAINABLE DEVELOPMENT**

### ***Learning Outcomes***

*Upon completing this course, the students will be able to:*

- 1. understand the distinctiveness of geographic environment as a field of learning.*
- 2. develop a keen interest in the subject in terms of the key components and functions, and processes of different aspects of the environment and pursue it for further research.*

### **Unit I**

***Concepts of Environment and Sustainable Development:*** Meaning, multi-disciplinary nature, Components, Functions, and Processes of Geographic Environment. Resources, Environment, Development and concept of Sustainability, Sustainable Development and its significance.

### **Unit II**

***Forest and Mountain Ecosystems:*** Processes, Patterns and Biodiversity - Problems and Sustainable Management.

***Desert Ecosystem:*** Desertification, Processes, Patterns and sustainable Management Strategies.

### **Unit III**

***Sustainable Coastal Ecosystem:*** Processes, Problem and management of- Mangroves, Coastal pollution, Sea-ground water Interaction in coastal zones, Integrated Coastal Zone Management (ICZM).

***Sustainable Urban Ecosystems:*** Urban Environmental Problems, Urban Micro climates, Urban Heat Islands, Role of Urban Green Spaces and their Management.

### **Unit IV**

***Global and National Legislation:*** Environment and Sustainable Development Legislation in India and the world; Global conventions, Policies and Flagship Programmes, Goals, targets, achievements and the future scenarios.



**References:**

1. Chandana, R. C., (2002): Environmental Geography, Kalyani Publishers.
2. Cunningham, W. P., and Cunningham, M. A., (2004): Principles of Environmental Science: Inquiry and Applications, Tata McGraw Hill.
3. Das, R.C., et. al., (1998): The Environmental Divide: The Dilemma of Developing Countries, A.P.H. Publications.
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6. Miller, G. T., (2004): Environmental Science: Working with the Earth, Thomson Brooks Cole.
7. Munn, T., (Ed.) (2001): Encyclopedia of Global Environmental Change, John Wiley & Sons.
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11. Singh, S., (1997): Environmental Geography, Prayag Pustak Bhawan.
12. Smith, T. M., and Smith, R. L., (2012): Elements of Ecology (8th Edition), Pearson Education Inc.
13. Martin J. O., (2018): Introduction to Sustainable Development, SAGE Publications India Pvt Ltd.
14. Yadav S., Bharati, R. P., (2013): Forest Management and Conservation, D.P.S. Publishing House.
15. Cloudsley, J. L. T., (2001): Ecology of Desert Environments, Scientific Publishers.
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**Mapping of Program Outcomes with Course Outcomes**

	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>
<b>CO1</b>	X				
<b>CO2</b>	X	x	x	x	x
<b>CO3</b>	x			x	x



Credits: 3

Course Code: 21GEODSE3

### **ADVANCES IN REMOTE SENSING**

#### ***Learning Outcomes***

*Upon completing this course, the students will be able to:*

- 1. understand fundamental concepts of hyperspectral and microwave remote sensing and their acquisition*
- 2. gain knowledge on theoretical background involved in contemporary remote sensing data processing techniques*
- 3. proficiently interpret high resolution multi-source remote sensing data and critically evaluate the extracted information*
- 4. formulate the research objective which requires robust data for the better understanding of environment related problems*

#### **Unit I**

***Hyperspectral Remote Sensing:*** Basic Concepts, Spectral Radiometry, HS data acquisition, Spectroscopy – Point and Imaging; BDRF and hemispherical reflectance; Airborne and Spaceborne hyperspectral systems; Spectral library.

#### **Unit II**

***Hyperspectral Image Analysis:*** Hughes phenomenon, Pre-processing, Feature Reduction, Endmember Collection: Spectral Unmixing, Spectral Matching; Classification Techniques

#### **Unit III**

***Microwave Remote Sensing:*** Concepts, active and passive systems; RADAR: principles and development, Polarization, Speckle noise filtering; SAR: principles and system parameters; Surface roughness characteristics; Scattering models: surface and volume scattering.

#### **Unit IV**

***Microwave Image Analysis:*** Atmospheric interaction; SAR Interferometry, Differential SAR Interferometry, Polarimetric InSAR; UAV remote sensing; Applications in earth resource monitoring



**References:**

1. Jensen, J. R., (2006). Introductory Digital Image Processing: A Remote Sensing Perspective, 3<sup>rd</sup> Edition, Prentice-Hall Inc., New Jersey.
2. Richards, J. A. and Xiuping, J., (2005). Remote Sensing Digital Image Analysis: An Introduction, 4<sup>th</sup> Edition, Springer –Verlag, Berlin.
3. Tso, B. and Mather, P. M. (2012). Classification Methods for Remotely Sensed Data, 2<sup>nd</sup> Edition, CRC Press, Boca Raton, FL.
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10. Woodhouse, I. H. (2006). Introduction to Microwave Remote Sensing, CRC Press, Boca Raton, FL.
11. Richards, J. A. (2009). Remote Sensing with Imaging Radar, Springer-Verlag Berlin Heidelberg.
12. Hanssen, R. F. (2001). Radar Interferometry: Data Interpretation and Error Analysis, 1<sup>st</sup> Edition, Springer Netherlands.

**Mapping of Program Outcomes with Course Outcomes**

	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>
<b>CO1</b>	x				x
<b>CO2</b>			x	x	x
<b>CO3</b>	x		x	x	x
<b>CO4</b>	x	x	x	x	x



Credits: 3

Course Code: 21GEODSE4

## **APPLIED GEOMORPHOLOGY**

### ***Learning Outcomes***

*Upon completing this course, the students will be able to:*

- 1. understand basics of fluvial-coastal forms and processes and likely changes resulting from those processes*
- 2. assess geomorphic dynamics for better landscape and environmental management*
- 3. apply advanced methods and techniques in analysis of geomorphic data*

### **THEORY**

#### **UNIT I - Applied fluvial geomorphology**

1. River basin and watersheds
2. Drainage patterns
3. Channel types and morphological classification
4. Longitudinal profiles, baselevel and grade

#### **UNIT II – Applied coastal geomorphology**

5. Coastal processes: destructional and constructional
6. Delta: types, morphology and dynamics
7. Estuaries: formation, types, estuarine circulation and mixing
8. Coastal sediments: textural parameters, magnetic susceptibility and geochemistry

#### **UNIT III - Quaternary and ancient landscapes**

9. Dating techniques
10. Records of climatic and sea-level changes
11. Relict landforms
12. Landscape cycles

#### **UNIT IV – Fluvial-coastal dynamics and environmental management**

13. Dams, river dynamics and flood
14. Sediment dynamics
15. Dynamics of river confluences
16. Human impacts on the fluvial system

### **TUTORIAL / LAB**

1. Strahler's method of stream ordering
2. Hypsometric curve and longitudinal profiles
3. Geomorphological field mapping
4. Granulometric analysis
5. Identification and extraction of geomorphological features from DEM
6. Flood hazard mapping

### **FIELD TRIP**

There will be a field trip during which student will expose to a geomorphic system and techniques of field data collection. A report should be submitted after the field trip.



**References:**

1. Thornbury, W. D., (2019): Principles of Geomorphology, Third Edition, New Age International Publishers.
2. Huggett, R. J., (2007); Fundamentals of Geomorphology, Routledge.
3. Michael, A. S., (1991): Global Geomorphology – An introduction to study of landforms. Pearson Education Limited.
4. Gupta, A., (2011): Tropical Geomorphology. Cambridge University Press.
5. Rhoads, L. B., (2020): River Dynamics-Geomorphology to Support Management. Cambridge University Press.
6. Lyon, J. G., (2003): GIS for Water Resource and Watershed Management, Taylor and Francis.
7. <https://www.tulane.edu/~sanelson/eens1110/streams.htm>
8. <https://www.sciencedirect.com/science/article/abs/pii/S0070457107100054>

**Mapping of Program Outcomes with Course Outcomes**

	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>
<b>CO1</b>	x	x	x	x	x
<b>CO2</b>		x	x	x	x
<b>CO3</b>		x	x	x	x



Credits: 3

Course Code: 21GEODSE5

## **MODELS IN GEOGRAPHY**

### ***Learning Outcomes***

*Upon completing this course, the students will be able to:*

- 1. understand fundamental concept and function of models, and four traditions in geography.*
- 2. gain knowledge on measurement and classification models and their applications.*
- 3. apply the spatial interaction and spatial diffusion models to study spatial problems.*

### **Unit I**

Introduction to models: Function of models, Procedural problems of use of models, Types of model, Models and Paradigms in Geography - Four Traditions in geography: Spatial tradition, Area Studies tradition, Man-Land tradition, and Earth Science tradition.

### **Unit II**

Measurement Models: Nominal, Ordinal, Interval and multidimensional, application and validation, measurements in geography – Classification: logic and purpose, properties and procedure for classification, quantitative techniques.

### **Unit III**

Spatial interaction models: Complementarity, Intervening opportunity, and Transferability - Potential models and Gravity models – Spatial Diffusion: Dynamics of Spatial Pattern, Levels, Scales, and Cones of Resolution.



**References:**

1. Harvey, D., (1969): Explanation in Geography, Edward Arnold Publishers Ltd.
2. Abler, R., Adams, J. S., and Gould, P., (1971): Spatial Organization: The Geographer's View of the World, Prentice-Hall Inc.
3. Chorley, R. J., and Haggett, P. (Eds.) (2013): Socio-Economic Models in Geography, Routledge.
4. Chorley, R. J., and Haggett, P. (Eds.) (2013): Integrated Models in Geography, Routledge.
5. William D. Pattison, W. D., (1964): The Four Traditions of Geography, Journal of Geography, Vol. 63 (5), pp. 211–216.
6. Robinson J. L., (1976): A New Look at the Four Traditions of Geography, Journal of Geography, Vol. 75 (9), pp. 520-530.
7. Husain, M. (2016): Models in Geography, Rawat Publications.
8. Peet, R. (1998): Modern Geographical Thought, Blackwell Publishers Ltd.

**Mapping of Program Outcomes with Course Outcomes**

	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>
<b>CO1</b>	x			x	
<b>CO2</b>	x			x	
<b>CO3</b>	x			x	x





Credits: 3

Course Code: 21GEODSE6

## **URBAN GIS**

### ***Learning Outcomes***

*Upon completing this course, the students will be able to:*

- 1. gain knowledge of basic characteristics of urban environments, their common social and physical structures, and issues.*
- 2. understand spatial processes and explore the spatial relationships in urban areas.*
- 3. apply geospatial techniques in the urban environment.*
- 4. create a spatial decision support system for sustainable urban management.*

### **Unit I**

Urban definition, Urban terminology, Site and Situation, Structure of cities, Size and scale of cities, Urban Growth, Urban environmental problems, and issues.

### **Unit II**

Urban as a system of systems, Urban infrastructure, Urban green space and blue space, Urban governance, Urban planning, Sustainable urban development, Smart city.

### **Unit III**

Introduction to GIS - basic components of GIS, Urban GIS, Urban Spatial Data Types -Raster and Vector, Attributes and metadata, Sources of data, Introduction to GIS software to process, and analyse spatial data, Spatial Analysis, and Spatial decision support system.

### **Unit IV**

Applications of GIS in the urban environment: Urban growth, Land use land cover change analysis, Network analysis, Site suitability analysis, Poverty and Crime analysis, Urban health, Conservation of green space, water resources, Urban modelling, Urban disasters.

Pilot Project work on one of the applications.



### References:

1. Johnson, J. H., (2013): Urban Geography: An Introductory Analysis, 2nd Edition, Fisher W. B. (Ed.), Pergamon Oxford Geographies.
2. Ghosh, S. (1998): Introduction to Settlement Geography by, Orient Longman, 1998
3. Singh, R.B. (Ed.), (1991): Environmental Monitoring: Application of Remote Sensing and GIS, Geocarto Int. Centre.
4. Singh, R.B. and Murai, S. (Eds.), (1998): Space Informatics for Sustainable Development, Oxford & IBH Publications.
5. Burrough, P. A., and Mc Donnell, R. A., (1998): Principles of Geographic Information Systems, Oxford University Press.
6. Chang, K. T., (2006): Introduction to Geographic Information Systems, Tata McGraw-Hill.
7. De Mers, M. N., (1999): Fundamentals of Geographic Information Systems, John Wiley & Sons.
8. Environmental Systems Research Institute (ESRI), (1997): Getting to know Arc View GIS, Cambridge: Geoinformation International.
9. Heywood, I. et. al., (2004): An Introduction to Geographic Information Systems, Pearson Education.
10. Longley, P.A., Goodchild, M.F., Maguire, D.J. and Rhind, D.W., (2001): Geographic Information Systems and Science, Wiley.
11. Maguire, D.J., Goodchild, M.F., and Rhind, D.W., (1991): Geographic Information Systems, Longman Scientific and Technical.
12. Maantay J., and Ziegler J., (2006): GIS for the Urban Environment, ESRI press.
13. Census Handbooks, Census of India.

### Mapping of Program Outcomes with Course Outcomes

	PO1	PO2	PO3	PO4	PO5
CO1	x	x		x	
CO2	x	x	x	x	x
CO3			x		x



# **SEMESTER – III**



Credits: 4

Course Code: 21GEOCC8

## **HYDROLOGY AND OCEANOGRAPHY**

### ***Learning Outcomes***

*Upon completing this course, the students will be able to:*

- 1. understand the fundamental components of hydrological cycle and water resource evaluation.*
- 2. explain the comprehend practices of integrated watershed management and groundwater management.*
- 3. analyse oceanic circulation systems as well as their interconnections and driving forces.*
- 4. understand the origin and distribution of marine resources and provide essential background for further studies in ocean and marine environment.*

### **Unit I**

Hydrological Cycle: Systems Approach in Hydrology, Hydrological Input and Output, Physical Process and Estimation - Water Resources Evaluation: Surface runoff, Groundwater Occurrence and Movement, Hydrograph Analysis.

### **Unit II**

Anthropogenic Intervention in Hydrological cycle: Problems of Regional Hydrology – Watershed Approach: Watershed Modelling, Integrated Watershed Management, Water Quality.

### **Unit III**

Oceanography: Configuration of ocean floor, temperature, salinity and density of ocean water - Circulation of oceanic waters: waves, tides and currents, Currents of the Atlantic, Pacific and Indian oceans, El Nino-Southern Oscillation.

### **Unit IV**

Ocean Resources: Types and Theories of Origin and Distribution, Deep Sea Ecology - Coastal and Marine Ecosystems: Mangroves, Coral Reefs, Marine Deposits, Natural and Anthropogenic Impacts.



**References:**

1. Waugh, D., (2005): Geography: An Integrated Approach, Nelson Thornes.
2. Tideman, E. M., (1999): Watershed management – Guidelines for Indian Conditions, Omega Scientific Publishers.
3. Todd, D. K., (1959): Groundwater Hydrology, McGraw Hill Book Company.
4. Lawrence, S. D., (2008): Physical Hydrology, Waveland Press.
5. Karanth, K. R., (1988): Ground Water: Exploration, Assessment and Development, Tata- McGraw Hill.
6. Ward, and Trimble, (2004): Environmental Hydrology, Lewis Publishers, CRC Press.
7. Rajora, R., (2002): Integrated Watershed Management, Rawat Publications.
8. Mitchell, C.W., (1991): Land Evaluation, John Wiley & sons Inc.
9. Pinet, P. R., (2012): Invitation to Oceanography, 6<sup>th</sup> Edition, Jones & Bartlett Learning.
10. Stewart, R., (2009): Introduction to Physical Oceanography, Orange Grove Books.
11. Christopherson, R. W., and Birkeland, G. H., (2012): Geosystems: An Introduction to Physical Geography (8<sup>th</sup> edition), Pearson Education.
12. Strahler, A. H., and Strahler, A. N., (2001): Modern Physical Geography (4<sup>th</sup> Edition), John Wiley and Sons, Inc.
13. Sharma, R. C., and Vatal, M., (1970): Oceanography for Geographers, Chaitanya Publishing House.

**Mapping of Program Outcomes with Course Outcomes**

	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>
<b>CO1</b>	x	x			
<b>CO2</b>	x	x		x	
<b>CO3</b>	x	x	x		x
<b>CO4</b>	x	x		x	



Credits: 4

Course Code: 21GEOCC9

## **GEOGRAPHY OF INDIA**

### ***Learning Outcomes***

*Upon completing this course, the students will be able to:*

1. *understand the physical, cultural, economic, and demographic aspects with reference to India and pursue it for further research.*
2. *acquaint with the distinctiveness of geographic regions as the field of learning in Geographical studies.*

### **Unit I**

***Physical Setting:*** Physiographic structure and divisions - Drainage systems – soils – vegetation - climate (Characteristics and classification) - Origin of Indian Monsoons.

### **Unit II**

***Resources and Agriculture:*** Agricultural production, and distribution of major crops, Resource Distribution, and utilization in India, Minerals, fossil and, nuclear fuels and non-conventional energy, Industrial Development, Automobiles and Information Technology.

### **Unit III**

***Population and Settlements:*** Historical and recent structure and distribution of Population; Population, Density, Literacy, Sex-ratio, Language, Tribes, Rural Urban Morphology, Trends of Urbanization, Metro and Mega Cities problems of urbanization - Future scenarios.

### **Unit IV**

***Geopolitics of India:*** Internal political geography of India - conflicts and strategic alliance with neighbouring countries – India, the South Asian Country, as an emerging political and economic power, strategic partner - prospects and challenges.



**References:**

1. Deshpande, C. D., (1992): India: A Regional Interpretation, ICSSR.
2. Johnson, B. L. C., Ed. (2001). Geographical Dictionary of India. Vision Books.
3. Mandal R. B., (Ed.), (1990): Patterns of Regional Geography – An International Perspective. Vol. 3 – Indian Perspective.
4. Galina, S., and Sengupta, P., (1967): Economic Regionalisation of India, Census of India.
5. Sharma, T.C., (2013): Economic Geography of India. Rawat Publication.
6. Singh, R. L., (1971): India: A Regional Geography, National Geographical Society of India.
7. Singh, J., (2003): India - A Comprehensive & Systematic Geography, Gyanodaya Prakashan.
8. Singh, R. B., Schickhoff, U., and Suraj M., (Eds.) (2016): Climate Change, Glacier Response, and Vegetation Dynamics in the Himalaya, Springer.
9. Singh, R. B., (2014): Urban Development Challenges, Risk & Resilience in Asian Mega Cities, Springer.
10. Spate, O. H. K., and Learmonth A. T. A., (1967): India and Pakistan: A General and Regional Geography, Methuen.
11. Tirtha, R., (2002): Geography of India, Rawat Publications.
12. Tiwari, R.C., (2007): Geography of India. Prayag Pustak Bhawan.
13. Menon, S., (2018): Inside the Making of India's Foreign Policy, Penguin Random House India Private Limited.
14. Aliberti, M., (2018): India in Space: Between Utility and Geopolitics, Springer International Publishing.
15. Chapman, G. P., (2012): The Geopolitics of South Asia, From Early Empires to the Nuclear Age, Ashgate Publishing Limited.
16. Singh, A., Kaushiva, P., (2014): Geopolitics of the Indo-Pacific, KW Publishers.
17. Ayres, A., (2018): Our Time Has Come, How India is Making Its Place in the World.

**Mapping of Program Outcomes with Course Outcomes**

	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>
<b>CO1</b>	x	x	x		x
<b>CO2</b>	x				x



Credits: 4

Course Code: 21GEOCC10

## **REGIONAL PLANNING AND DEVELOPMENT**

### ***Learning Outcomes***

*Upon completing this course, the students will be able to:*

1. *have an understanding on basic mechanism involved in regional planning.*
2. *acquire overall idea on government programs aimed at regional development in India.*
3. *develop a keen interest in the socio and economic development strategies and importance of regional development.*

### **Unit I**

***Regional Concepts in Geography:*** Concept of Region, types and delineation, Formal and functional; uniform and nodal, single purpose and composite regions, in the context of planning; regional hierarchy.

### **Unit II**

***Theories of Spatial Development and Planning Processes:*** Growth pole, Core-Periphery, Basic needs Strategy; Sectorial, Multilevel, decentralized planning. Integrated Area Development Planning (IADP) - Planning for metropolitan region: CDP, satellite towns, urban green belt.

### **Unit III**

***Regional Development and Disparities:*** Resources, Industrialization, Urbanization, and Regional Development with special reference to India, , Indicators to measure Development & under development, Regional disparities and consequences in India.

### **Unit IV**

***Planning and Regional Development in India:*** Regional development strategies in pre and post independent India; Regional Planning Hierarchy, Five-Year Plans, Annual Plans, Constitutional Amendments 73 and 74, Panchayat Raj, NITI Aayog, Regional Development Schemes and Programs.





**References:**

1. Bhat, L.S., (2009): Geography in India (Selected Themes). Pearson.
2. Bonnett, A., 2008: What is Geography? Sage.
3. Dikshit, R. D., (1997): Geographical Thought: A Contextual History of Ideas, Prentice–Hall India.
4. Haggett, P., Cliff, A. D., and Frey (1977): Locational Analysis in Human Geography. London: Arnold.
5. Hartshorne, R., (1959): Perspectives of Nature of Geography, Rand Mac Nally and Co.
6. Harvey, D., (1969): Explanation in Geography. London: Arnold.
7. Holt-Jensen, A., (2011): Geography: History and Its Concepts: A Students Guide, SAGE.
8. Johnston, R. J., (Ed.): Dictionary of Human Geography, Routledge.
9. Geoffrey, J. M., (2005): All Possible Worlds: A History of Geographical Ideas, Oxford.
10. Siddhartha, K., and Mukherjee, S., (2016): A Modern Dictionary of Geography, Kitab Mahal.
11. Singh, R. B., (2016): Progress in Indian Geography, Indian National Science Academy, New Delhi.
12. Soja, E., (1989): Post-modern Geographies, Verso, London. Reprinted 1997: Rawat Publications.
13. <https://www.e-education.psu.edu/geog571/node/366>

**Mapping of Program Outcomes with Course Outcomes**

	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>
<b>CO1</b>	x	x			
<b>CO2</b>	x	x			
<b>CO3</b>	x	x			



Credits: 4

Course Code: 21GEOSEC4

### **IMAGE ANALYSIS - PRACTICAL**

#### ***Learning Outcomes***

*Upon completing this course, the students will be able to:*

- 1. augment knowledge and skills of image interpretation and mapping, and have experience with image processing software.*
- 2. develop analytical workflows to derive products and extract information from remote sensing images for a broad range of applications.*
- 3. apply image processing and interpretation skills independently to a real-world situation.*
- 4. develop satellite data processing and analysis skills which is helpful for the employability of the students.*

#### **Unit I**

Visual Image Interpretation: Visual interpretation keys - Comparison of true colour, false colour and panchromatic images - Interpretation of aerial photos and satellite images.

#### **Unit II**

Digital Image Processing: Introduction to image processing software - Image formats - Layer stacking - Haze reduction - Contrast enhancement - Density slicing - Low pass and high pass filtering.

#### **Unit III**

Image Classification and Mapping: Supervised classification - Unsupervised classification - Accuracy assessment - Object based Image Analysis - Preparation of LU/LC map.

#### **Unit IV**

Advanced Image Analysis: Band ratios - NDVI - Change detection - DEM generation - Create hill shade image; GEE.



**References:**

1. Jensen, J. R., (2006): Introductory Digital Image Processing: A Remote Sensing Perspective, 3<sup>rd</sup> Edition, Prentice-Hall Inc.
2. Imagine, (2009): Tour Guide Imagine, Leica Geosystem GIS & Mapping, Atlanta.
3. Richards, J. A. and Jia X., (2005): Remote Sensing Digital Image Analysis: An Introduction, 4<sup>th</sup> Edition, Springer –Verlag.
4. Gonzalez, R. C. and Woods, R. E., (2007): Digital Image Processing, 3<sup>rd</sup> Edition, Prentice-Hall Inc.
5. Lillisand, T. M., and Kiefer, P. W., (2007): Remote Sensing and Image Interpretation, 6<sup>th</sup> Edition, John Wiley & Sons.
6. Campbell, J. B. and Wynne, R. H., (2011): Introduction to Remote Sensing, 5<sup>th</sup> Edition, The Guilford Press.
7. Gibson, P., and Power, C. H., (2000): Introductory Remote Sensing: Digital Image Processing and Applications, Routledge Publisher.

**Mapping of Program Outcomes with Course Outcomes**

	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>
<b>CO1</b>	x		x		x
<b>CO2</b>	x		x	x	x
<b>CO3</b>	x	x	x		x
<b>CO4</b>			x	x	x



Credits: 4

Course Code: 21GEOCC11

### **RESEARCH AND SURVEY METHODS - PRACTICAL**

#### ***Learning Outcomes***

*Upon completing this course, the students will be able to:*

1. *Acquaint with the basic knowledge about research in terms of; research design, data collection, analysis, and report writing.*
2. *Enable students to handle a range of surveying instruments from traditional chains to modern total stations and GNSS.*
3. *Develop a keen interest in research and use of survey skills for future research.*

#### **TUTORIALS**

- Tu.1:** Procedure of scientific research
- Tu.2:** Methods and size of sampling
- Tu.3:** Methods of primary and secondary data collection
- Tu.4:** Ethical issues in data collection
- Tu.5:** Citation rules and styles
- Tu.6:** General principles of land surveying

#### **EXERCISES**

- Ex.1:** Distance measurement
- Ex.2:** Angles, azimuths and bearings
- Ex.3:** Triangulation
- Ex.4:** Traversing
- Ex.5:** Computation of area
- Ex.6:** Mapping surveys with Total Station
- Ex.7:** Mapping surveys with GNSS

#### **FIELD REPORT**

The students need to define a research problem and conduct a pilot study. A report should be submitted which should consist of problem statement, sampling design, data collection, data analysis, interpretation and conclusion.



**References:**

1. Kothari, C. R., (1994): Research Methodology: Methods and Techniques, Wishwa Prakashan.
2. Gomez, B., and Jones, J. P., III (2010): Research Methods in Geography: A Critical Introduction, John Wiley and Sons.
3. Montello, D., and Sutton, P., (2013): An Introduction to Scientific Research Methods in Geography and Environmental Studies, SAGE Publications.
4. Buckingham A., and Saunders, P., (2014): The survey methods workbook, Rawat Publications.
5. Punmia, B. C., Ashok, J. K., and Arun, K. J., (2005): Surveying-1, Vol. 1, Laxmi Publications.
6. Rampal, K.K (2011): Surveying, Pragati Prakashan.
7. Ghilani, C. D., and Wolf, P. R., (2012): Elementary Surveying: An Introduction to Geomatics, 13<sup>th</sup> Edition, Pearson Education, Inc.

**Mapping of Program Outcomes with Course Outcomes**

	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>
<b>CO1</b>	x		x	x	x
<b>CO2</b>				x	x
<b>CO3</b>	x		x	x	x



# **SEMESTER – IV**



Credits: 8

Course Code: 21GEOCC12

**DISSERTATION*****Learning Outcomes****Upon completing this course, the students will be able to:*

1. *identify and define research problem and parameters.*
2. *collect and analyse the data in a systematic and scientific manner.*
3. *formulate and carry out independent research in the general field of geography.*
4. *write a scientific research report, thesis, and research proposal.*

Students need to carry out dissertation work in a reputed academic/scientific institution or industry, write a thesis and defend it at the end. The thesis will be supervised and assessed by internal and external members. The students should select a specific topic from the following broad areas for conducting the research work.

- |                                      |  |
|--------------------------------------|--|
| a) Applied Geomorphology             | k) Sustainable Tourism                 |
| b) Applied Climatology               | l) Urban Sustainability in Mega Cities |
| c) Integrated Watershed Management   | m) Urban Planning and Smart Cities     |
| d) Coastal Zone Management           | n) Rural and Regional Development      |
| e) Biodiversity and Conservation     | o) Remote Sensing                      |
| f) Environmental Impact Assessment   | p) GIS and Location Analytics          |
| g) Agriculture and Land Use Planning | q) Spatial Decision Support System     |
| h) Human Health and Wellbeing        | r) Climate Change                      |
| i) Demography and Social Wellbeing   | s) Disaster Risk Reduction             |
| j) Energy Resources                  | t) Sustainable Development Goals       |

The thesis should be between 80 and 100 pages including maps, tables, diagrams and graphs. The ideal structure of thesis is a) Introduction, b) Objectives c) Study Area, d) Materials and Methods, e) Results and Discussion, f) Summary and Conclusion, g) References, and h) Appendices.

**Mapping of Program Outcomes with Course Outcomes**

	PO1	PO2	PO3	PO4	PO5
CO1			X	X	X
CO2			X	X	X
CO3	X	X	X	X	X
CO4	X		X	X	X



Credits: 2

Course Code: 21GEOAECC2

### **INTERNSHIP**

#### ***Learning Outcomes***

*Upon completing this course, the students will be able to:*

- 1. understand the organizational concepts and working culture.*
- 2. acquire practical skills and offers opportunities to meet people and build a network that will help with future education or employment.*
- 3. adapt effectively to changing conditions and demonstrate effective management of personal behaviour, ethics and attitudes.*

After completing the first two semesters, students need to undergo an internship in a reputed institution or industry with a mandate to work as a member of a research group in a project in close association with the subject matter experts. The minimum period of internship should be 30 days. The students need to submit a report (minimum of 10 pages) covering the aspects of a) industry/organization background, customs and practices b) intern duties and individual responsibility c) professional skills gathered and d) usefulness and career networking.

Getting Attendance/ Internship completion Certificate from the host institution is mandatory.

#### **Mapping of Program Outcomes with Course Outcomes**

	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>
<b>CO1</b>	x			x	x
<b>CO2</b>			x	x	x
<b>CO3</b>				x	x





Credits: 3

Course Code: 21GEOAECC3

### **FIELD WORK**

#### ***Learning Outcomes***

*Upon completing this course, the students will be able to:*

- 1. identify geographical problems and understand the linkage between lab and field.*
- 2. conduct field oriented research and demonstrate field data collection.*

After completing the first two semesters, students need to undergo a field work and prepare a report. The duration, location and purpose of the visit will be decided by concerned faculty members.

#### **Mapping of Program Outcomes with Course Outcomes**

	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>
<b>CO1</b>	X	X	X	X	X
<b>CO2</b>			X	X	X



## **ACADEMIC WRITING**

### ***Learning Outcomes***

*Upon completing this course, the students will be able to:*

1. *understand important aspects of academic culture and communication.*
2. *develop more productive, effective writing with healthier, more positive approaches.*

### **Unit I**

Defining and understanding academic writing – organizing the materials – construction of thesis statement; Usage of appropriate words in academic essay – use of formal vocabulary - Scientific CV writing.

### **Unit II**

Reporting research findings – Result interpretation; Proofreading an essay or report – typographical errors – grammatical errors – Academic integrity – Citations and plagiarism.

### **Unit III**

Preparation of presentation – Oral and poster presentations; Working in groups – respect other people’s writing styles and decisions – use of common language.

### **References:**

1. Becker, H. S., (1986): Writing for Social Scientists: How to Start and Finish Your Thesis, Book or Article, University of Chicago Press.
2. Wesiman, H., (1996): Basic technical reporting, Prentice Hall Publications.
3. Tupas, T. R. F., Cook, C., and Ismail, N. B. T., (2009): Communicating in the University Culture, Centre for English Language Communication, National University of Singapore.
4. Lee, K.C., Goh, H., Chan, J., and Yang, Y. (2007): Effective college writing: A process genre approach, McGraw-Hill Publications.
5. Oshima, A., and Hogue, A. (2006): Writing academic English, Pearson Publications.
6. Bailey, S. (2015): Academic Writing for International Students of Business (Second Edition), Routledge Publications.
7. Zemach, D. E. and Rumisek, L. A. (2005): Academic Writing: from Paragraph to Essay, Macmillan Publications.
8. Murray, R. and Moore, S. (2006): The Handbook of Academic Writing: A Fresh Approach, McGraw-Hill Publications.

### **Mapping of Program Outcomes with Course Outcomes**

	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>
<b>CO1</b>	x			x	x
<b>CO2</b>				x	x