Central University of Punjab

Ph.D. Geography

Academic Session: 2024

Graduate Attributes

The researchers of Geography programme are expected to formulate research problems in the field of geography and demonstrate research skills to apply their knowledge in finding solutions to the contemporary and emerging socio-geographical and geo-environmental problems. They will be able to apply their critical, creative, and evidence-based thinking to solve the real-world issues and future challenges. They will develop analytical and digital capabilities through the skill-based course work designed for them. They have ability to work effectively in a team and demonstrate leadership quality in academic as well as professional environment. They will also recognize the essential value systems including academic ethical practices, the moral dimensions of one's own decisions. They have respect for the diverse culture and pluralistic society and can demonstrate the ethical competency at all stages of life.

Department of Geography

Syllabus for Ph.D. Coursework in Geography					
Course Code	**Course Title**	**Course type**	**Credit Hours**		
			L	**P**	**Cr**
GEO.701	Research Methodology in Geography	C	4	-	4
GEO.702	GIS & GPS (Practical)	SBC	-	4	2
GEO.751	Research and Publication Ethics	C	2	-	2
UNI.753	Curriculum, Pedagogy and Evaluation	C	1	-	1
GEO.752	Teaching Assistantship	SBC	-	2	1
Elective courses: Select any one of the specialized courses listed below					
GEO.704	Population, Development, and Environment	DE	4	-	4
GEO.705	Advanced Urban Planning and Management	DE	4	-	4
GEO.706	Paleoclimatology	DE	4	-	4
GEO.708	Natural Hazards and Disasters	DE	4	-	4
GEO.709	Food Security	DE	4	-	4
	Total		**11**	**6**	**14**

C: Core, **SBC**: Skill Based Course, **DE: Discipline Elective L**: Lecture, **T**: Tutorial, **P**: Practical, **Cr:** Credit

Evaluation Criteria

Evaluation Criteria for Examination – Theory Paper
End Semester Examination- 100 marks

Evaluation Criteria for Practical Examination			
End Semester performance	**Practical copy**	**Viva**	**Total**
50	30	20	100

Course Title: Research Methodology in Geography	**L**	**T**	**P**	**C**
Course Code: GEO.701	**4**	**-**	**-**	**4**

Total Hour: 60 Hours

Course Learning Outcomes (CLO):

On completion of this course, students will be able to:

CLO1: Proficient to comprehend basic concepts, theory, and framework of Research paradigms in geography,

CLO2: Proficient to explore the basic concepts, theory, and framework of research procedure in geography,

CLO3: Proficient to explore methods of data collection and analysis in geographical research,

CLO4: Proficient to explore the procedure of scientific thesis and paper writing.

.

Hours/ Unit	Contents	Mapping with CLO
15 Hours/ Unit I	**Research paradigm in geography** Concept, theory and types of geographical research, Scientific research philosophy: Kuhn and David Harvey philosophy, Scientific reasoning: inductive and deductive, empirical and general; Geographical research: models and tools: Discipline-wise geographical research: A survey	CLO1
15 Hours/ Unit II	**Research procedure/Research design and methodology:** Research approach: qualitative, quantitative and mixed, Research design: methods and tools, Research process: steps in scientific research, Research valuation: SWOT analysis, Cost-benefit analysis	CLO2
15 Hours/ Unit III	**Unit III: Methods of data collection and analysis** Concept and types of data and information, Data collection instruments and process, Data sources and data collection ethics, Cloud-based and off-cloud data mining, Applied geostatistics: descriptive and inferential geostatistics	CLO3
15 Hours/ Unit IV	**Unit IV: Scientific thesis and paper writing** Scientific thesis writing: methods and tools, Scientific paper writing: methods and tools, Bibliography, referencing and citation: methods and tools, Research ethics: copyright issues and plagiarism, Guideline for theme-based journal articles	CLO4

Transaction Mode: Lecture delivery using White Board and PPT, Problem Solving through Assignments.

Suggested readings:

1. Amedeo, D. and Golledge, R.G. (1975). An introduction to scientific reasoning in geography, New York, Willey and Sons.
2. Berg, Bruce L. (2001). Qualitative Research Methods for Social Sciences. Boston: Allyn and Bacon.
3. Brent, E. E. (1990). Computer Applications in the Social Sciences. Philadelphia: Temple University Press.
4. Bryant, Christopher G. A. and David Jary (eds). (1991). Giddens' theory of structuration: a critical appreciation. London: Routledge.
5. Chakravarti, A.K. & Tiwari, R.C. (1990). A Basic Research Paradigm in Geography, Journal of Geography, 89:2, 53-57, DOI: 10.1080/0022134 90 08979595Sack, R. (1973).
6. Harvey, D. (1973). Explanation in Geography. Historical Methods Newsletter, 6(2), 68–72. doi:10.1080/00182494.1973.10593999

- Robert, A. (2002). Epistemology: A Contemporary Introduction to the Theory of Knowledge. London: Routledge

Course Title GIS & GPS – P	**L**	**T**	**P**	**C**
Course Code: GEO.703	**-**	**-**	**4**	**2**

Total Hour: 60 Hours

Course Learning Outcomes (CLO): After completion of the course the students will learn:
CLO1: theoretical framework in geographical information system
CLO2: Types of datasets
CLO3: Extraction, generation, and analysing of data.
CLO4: digital cartography
CLO5: Learning of GIS software

Hours	**Exercises**	**CLO**
60 hours	Georeferencing Maps/Images, Digitization of Raster Map: Point, Line and Polygon Features, Preparation of Attribute Tables, Editing and Joining Tables, Analyzing Attribute Data: Calculating Area, Perimeter, and Length. Spatial Representation: Mapping Techniques, Spatial Representation: Symbolizing and Map Layouts, Basic Analysis in GIS: Buffering, Overlay and Query Building, GPS Applications, User interface with global positioning receivers, Collection of ground control points using handheld GPS receiver, DGPS, wide area augmentation system (WAAS), Transferring data from GPS receiver to PC.	CLO1 CLO2 CLO3 CLO4 CLO5

Transaction Mode: Lecture, demonstration, tutorial, hands on exercise, problem solving.

1. Bhatta, B. (2011). Remote sensing and GIS, 2nd edition, New Delhi, Oxford University Press.
2. Harvey, F. (2016). A primer of GIS: Fundamental geographic and cartographic concepts, 2nd edition, New York, The Guilford press.
3. Holfmann-wellenhof, B., Lichtenegger, H., Collins, J., Hofmann-wellenhof, B. (2013). GPS global positioning system: Theory and practice 5th edition, New Delhi, Springer (India) private limited.
4. Kennedy, M. (2013). Introducing geographic information systems with arcgis: A workbook approach to learning GIS, 3rd edition, New Jersey, A John Wiley & Sons publications
5. Liu, Jian Guo & Mason, Philippa J. (2016). Image processing and GIS for Remote Sensing, Techniques and applications, 2nd edition Publication, United Kingdom, Wiley Blackwell.

   Van Sickle, J. (2008). GPS for land surveyors, 3rd edition, London, CRC press

Course Title: Research and Publication Ethics	L	**T**	**P**	**Cr**
Course Code: GEO.751	2	0	0	2

Total hour: 30 Hours

Course Learning outcome (CLO): Students will be able to:
CLO1: Demonstrate research integrity and publication ethic.
CLO2: Judge the misconduct, and plagiarism in research.
CLO3: Identify predatory journals
CLO4: Utilize various online literature data base and software to analyze their research output.

Hours/ Unit	Content	Mapping with CLO
3 Hours/ Unit I	**Philosophy and Ethics** Introduction to Philosophy: definition, nature and scope, content, Branches, Ethics: definition, moral philosophy, nature of moral judgements and reactions	CLO1
5 Hours/ Unit II	**Scientific Conduct** Ethics with respect to science and research, Intellectual honesty and research integrity, Scientific misconducts: Falsification, Fabrication, and Plagiarism (FFP), Redundant publications: duplicate and overlapping publications, salami slicing, Selective reporting and misrepresentation of data	CLO1 CLO2
7 Hours/ Unit III	**Publication Ethics** Publication ethics: definition, introduction and importance, best practices/ standards setting initiatives and guidelines: COPE, WAME, etc., Conflicts of interest	CLO1 CLO4
4 Hours/ Unit IV	**Open Access publishing** Open access publications and initiatives, SHERPA/RoMEO online resource to check publisher copyright & self-archiving policies, Software tool to identify predatory publication developed by SPPU, Journal finder/journal suggestion tools viz. JANE, Elsevier Journal Finder, Springer, Journal Suggester.	CLO3
4 Hours/ Unit V	**Publication Misconduct** Group Discussions: Subject specific ethical issues, FFP, authorship; conflicts of interest; complaints and appeals: examples and fraud from India and abroad, Software tools: Use of plagiarism software like Turnitin Urkund and other open-source software tools	CLO3
7 Hours/ Unit VI	**Databases and Research Metrics** Databases: Indexing databases; Citation database: Web of Science, Scopus etc., Research Metrics: Impact Factor of journal as per Journal Citation Report, SNIP, SJR, IPP, Cite Score; Metrics: h-index, g-index, i10 index, almetrics	CLO4

Course Title: Curriculum, Pedagogy and Evaluation	L	**T**	**P**	**Cr**
Course Code: UNI.753	0	0	2	1

Total hour: 15

Course Learning outcome (CLO): After completion of the course, scholars shall be able to:
CLO1: analyze the principles and bases of curriculum design and development
CLO2: examine the processes involved in curriculum development.
CLO3: develop the skills of adopting innovative pedagogies and conducting students' assessment
CLO4: develop curriculum of a specific course/programme

Hours/ Unit	Content	Mapping with CLO
4 Hours/ Unit I	**Bases and Principles of Curriculum** Curriculum: Concept and Principles of curriculum development, Foundations of Curriculum Development. Types of Curriculum Designs- Subject centered, learner centered, experience centered	CLO1

	and core curriculum. Designing local, national, regional and global specific curriculum. Choice Based Credit System and its implementation.	
4 Hours/ Unit II	**Curriculum Development** Process of Curriculum Development: Formulation of graduate attributes, course/learning outcomes, content selection, organization of content and learning experiences, transaction process, Comparison among Interdisciplinary, multidisciplinary and trans-disciplinary approaches to curriculum.	CLO2
3 Hours/ Unit III	**Curriculum and Pedagogy** Conceptual understanding of Pedagogy, Pedagogies: Peeragogy, Cybergogy and Heutagogy with special emphasis on Blended learning, Flipped learning, Dialogue, cooperative and collaborative learning, Three e- techniques: Moodle, Edmodo, Google classroom	CLO3
4 Hours/ Unit IV	**Learners' Assessment** Assessment Preparation: Concept, purpose, and principles of preparing objective and subjective questions, Conducting Assessment: Modes of conducting assessment – offline and online; use of ICT in conducting assessments. 3. Evaluation: Formative and Summative assessments, Outcome based assessment, and scoring criteria.	CLO4

Mode of Transaction: Lecture, dialogue, peer group discussion, workshop.

Evaluation criteria: There shall be an end term evaluation of the course for 50 marks for duration of 2 hours. The course coordinator shall conduct the evaluation.

Suggested readings:

Allyn, B., Beane, J. A., Conrad, E. P., & Samuel J. A., (1986). Curriculum Planning and Development. Boston: Allyn & Bacon.

- Brady, L. (1995). Curriculum Development. Prentice Hall: Delhi. National Council of Educational Research and Training.
- Deng, Z. (2007). Knowing the subject matter of science curriculum, Journal of Curriculum Studies, 39(5), 503-535. https://doi.org/10.1080/00220270701305362
- Gronlund, N. E. & Linn, R. L. (2003). Measurement and Assessment in teaching. Singapore: Pearson Education
- McNeil, J. D. (1990). Curriculum: A Comprehensive Introduction, London: Scott, Foreman/Little
- Nehru, R. S. S. (2015). Principles of Curriculum. New Delhi: APH Publishing Corporation.
- Oliva, P. F. (2001). Developing the curriculum (Fifth Ed.). New York, NY: Longman
- Stein, J. and Graham, C. (2014). Essentials for Blended Learning: A Standards-Based Guide. New York, NY: Routledge.

Web Resources

- https://www.westernsydney.edu.au/__data/assets/pdf_file/0004/467095/Fundamentals_of _Blended_Learning.pdf
- https://www.uhd.edu/academics/university-college/centers-offices/teaching-learningexcellence/Pages/Principles-of-a-Flipped-Classroom.aspx
- http://leerwegdialoog.nl/wp-content/uploads/2018/06/180621-Article-The-BasicPrinciples-of-Dialogue-by-Renate-van-der-Veen-and-Olga-Plokhooij.pdf

Course title: Teaching Assistantship	**Cr**	**T**	**P**
Course code: GEO.752	1	-	2
Total hours: 30			

Course Learning Outcome (CLO):
Learning Outcome:
At the end of this skill development course, the scholars shall be able to
(1) familiarize themselves with the pedagogical practices of effective classroom delivery and knowledge evaluation system
(2) manage large and small classes using appropriate pedagogical techniques for different types of
content

Activities and Evaluation:

- The scholars shall attend Master degree classes of his/her supervisor to observe the various transaction modes that the supervisor follows in the class room delivery or transaction process one period per week.
- The scholars shall be assigned one period per week under the direct supervision of his/her supervisor to teach the Master degree students adopting appropriate teaching strategy(s).
- The scholars shall be involved in examination and evaluation system of the Master degree students such as preparation of questions, conduct of examination and preparation of results under the direction of the supervisor.
- At the end of the semester, the supervisor shall conduct an examination of teaching skills learned by the scholar as per the following evaluation criteria:
- The scholars shall be given a topic relevant to the Master degree course of the current semester as his/her specialization to prepare lessons and deliver in the classroom before the master degree students for one hour (45 minutes teaching + 15 minutes interaction).
- The scholars shall be evaluated for a total of 50 marks comprising content knowledge (10 marks), explanation and demonstration skills (10 marks), communication skills (10 marks), teaching techniques employed (10 marks), and classroom interactions (10).

Thematic Papers (Select anyone)

Course Title: Population, Development and Environment	**L**	**T**	**P**	**C**
Course Code: GEO.704	**4**			**4**
Total Hour: 60 Hours				

Course Learning Outcomes (CLO): After completion of the course the students will learn:
CLO1: The conceptual framework of Population, development, and environment interactions
CLO2: To analyse the population dynamic
CLO3: To understand the Issues of population, development, and environment interaction at different scales
CLO4: To formulate research ideas and write synopsis, research proposals.

Hours/Unit	**Content**	**CLO**
15 Hours/ Unit I	**Basic Concepts:** Conceptual development and theoretical framework of population, environment and development interactions, Patterns of interaction. **Learning activities:** Group discussion	CLO1
15 Hours/ Unit II	**Elements of population dynamics** Fertility, mortality, migration and their relationship with Development, poverty, and resource inequalities.	CLO2

	Learning activities: Group discussion	
15 Hours/ Unit III	**Interaction of Population, development, and environment** Human development: Component, measurement, distribution, health inequalities, Population vs. environment with reference to climate change and global warming, water resources, food security, Natural hazard & Disaster, Land Use Land Cover Change. **Learning activities:** Assignment	CLO3
15 Hours/ Unit IV	**Research in Population, development, and environment** Quantitative and qualitative measurement of population, environment and development interactions, Data source, Remote sensing and GIS based study on the population, environment, and development interactions. **Learning activities:** case study	CLO4
Transaction Mode: Lecture, demonstration, tutorial, problem solving.		

Suggested readings:

1. Bhargava, R.N., Rajaram, V., Olson, Keith, Tiede, Lynn (2019). Ecology and Environment. CRC Press
2. Hunter, Lori M., Gray, Clark, Véron, Jacques (2022). International Handbook of Population and Environment. Springer.
3. James, Helen (2019). Population, Development, and the Environment: Challenges to Achieving the Sustainable Development Goals in the Asia Pacific. Palgrave Macmillan.
4. Kiessling, K.L. and Landberg, Hans (1997). Population, Economic Development, and the Environment. OUP Oxford.
5. Lakshmana, C.M. (2013). Population, development, and environment in India. Chinese Journal of Population Resources and Environment. Vol. 11, No. 4, 367–374, http://dx.doi.org/10.1080/10042857.2013.874517
6. Myers, N. (1993). Population, environment, and development. Environment Conservation. 20(3):205-16. doi: 10.1017/s0376892900022980
7. Sarre, Philip (1991). Environment, Population and Development. Hodder & Stoughton Educational Division.
8. Sinha, BRK (2009). Population, Environment & Development: A Global Challenge for the 21st Century. New Century Publications.

Course Title: Advanced Urban Planning and Management	**L**	**T**	**P**	**C**
Course Code: GEO.705	**4**			**4**
Total Hour: 60 Hours				

Course Learning Outcomes (CLO): After completion of the course the students will learn:

CLO1: Theories and approaches of urban planning and management
CLO2: Urbanization and different urban environmental issues of various scales.
CLO3: Urban social, housing, infrastructure challenges at city scale.
CLO4: Describe various parameters, framework, and tools of the sustainable city.
CLO5: Explains different dimensions and mapping tools of the resilient city.

Hours/ Unit	**Contents**	**CLO**

15 hours/ Unit I	**Introduction to urban planning and management** Urban planning concept, theory, and scope, Urban planning instruments, Urban planning metaphors, Urban planning policy, institutions, and governance, Contemporary urban planning challenges: Indian and beyond. **Learning activities:** Group discussion	CLO1
15 hours/ Unit II	**Urbanization and emerging Issues** Origin and growth of the town and cities, global context of urbanization and urban change. Trends and Patterns of Urbanization in India, Functional Classification of Towns, urban socio-ecological crisis, urban poverty, deprivation, and informal activity; Slum in the city; housing, infrastructure, and transportation challenges, Urban governance, urban reforms, Concept of food security: trends in Indian context. **Learning activities:** Assignment	CLO2 CLO3
15 hours/ Unit III	**Introduction to Sustainable City** Concept and theory of sustainable city, Planning framework for sustainable city, Indicators of sustainable city, sustainability index, Sustainable city at local to global context. Geospatial for sustainable city. **Learning activities:** Assignment	CLO4
15 hours/ Unit IV	**Introduction to Resilient City** Concept and theory of resilient city, planning instruments for resilient city, Climate resilient city, disaster resilient city, resilient city at local to global context. Geospatial analysis for resilient city. **Learning activities:** Assignment, case study	CLO5

Mode of Transaction: The course will be taught with a combination of lectures, discussion, and presentations**,** assignments, group learning exercise

Suggested readings:

1. Burgess, R., Marisa C., and Thed K. (1977). The Challenge of Sustainable Cities, Zed Books, New Jersey.
2. Carter, H. (1972). The Study of Urban Geography, Edward Arnold, London.
3. Choley, R.J.O. and Haggett, P. (1966). Models in Geography, Methuen, London.
4. Gibbs, J.P. (1961). Urban Research Methods, Princeton, New Jersey.
5. Goudie, A. (1993). The Human Impact on Natural Environment, Blackwell, USA.
6. Hall, P. (1992). Urban and Regional Planning, Routledge, London.
7. Knox, P. (1994). Urban Social Geography- An Introduction, Longman, U.K.
8. Nangia, S. (1976). Delhi Metropolitan Region: A Study in Settlement Geography, Rajesh Publications.
9. Pacione, M. (2009). Urban Geography: A Global Perspective. Routledge; 3 edition.
10. Ramachandran, R. (1997). Urbanization and Urban Systems in India. OUP India.
11. Yamagata, Y. and Yang, P. (2020). Urban Systems Design: Creating Sustainable Smart Cities in the Internet of Things Era. Elsevier Science Publishing Co Inc; 1 edition.
12. Yang, X. (2011). Urban Remote Sensing: Monitoring, Synthesis and Modelling in the Urban Environment. John Wiley and Sons Ltd.
13. Kemp, R. & et al. (2005). Governance for sustainable development: moving from theory to practice, *Int. J. Sustainable Development*, 8(1/2), 12-30.
14. Ness, B. & et al. (2007). Categorising tools for sustainability assessment, *Ecological Economics*, 60, 498–508.
15. Sharifia, A., & Yamagata, Y. (2014). Resilient Urban Planning: Major Principles and Criteria, *Energy Procedia*, 61, 1491-1495. https://doi.org/10.1016/j.egypro.2014.12.154.

16. Zhang, X. & Li, H. (2018). Urban resilience and urban sustainability: What we know and what do not know? *Cities*, 74(A), 141-148. https://doi.org/10.1016/j.cities.2017.08.009

Course Title: Paleoclimatology	**L**	**T**	**P**	**Cr**
Course Code: GEO.706	4	-	-	4
Total Hour: 60 Hours				

Course objective: The goal of this course is to present an overview of the methods used to reconstruct the earth's climate history and the techniques used to determine the timing of environmental changes. Paleoclimate data from proxy records, such as ice cores or tree rings, provides a longer perspective on climatic variability than is possible from instrumental or historical records. Particular emphasis will be given to the climatic changes during the late Cenozoic – the time of the ice ages.

Course Learning outcome (CLO): The students would be able to identify climate forcing and responses over longer time scale.
CLO1: To discuss the various components of Earth's climate system, such as the cryosphere, atmosphere, biosphere, and hydrosphere.
CLO2: To discuss tools and techniques used to interpret changes in Earth's climate through geologic time.
CLO3: To recognize and critique modern paleoclimate studies through the use of primary literature in climate science.
CLO4: To examine the variable time scales upon which different climate processes occur and understands as residence time, and periodicity.

Hours/ Unit		**CLO**
15 hours/ Unit I	**Fundamentals of Paleoclimate** Introduction and Why Study Paleoclimate, Overview of Climate Sciences, Earth's Climate System Today, Climate Archives, Data and Models	CLO1
15 hours/ Unit II	**Tectonic & Orbital-Scale Climate Change** Tectonic Scale Climate Change, CO_2 and Long-Term Climate, Gaia Hypothesis and Snowball Earth, Plate Tectonic Drivers, Greenhouse Climates, Greenhouse to Icehouse, Paleoclimate Evidence from Oxygen Isotope Measurements **Orbital-Scale Climate Change** Long term changes in the Earth's Orbit, Orbital Parameters, Changes in Insolation, Ice ages, Ice Cores and Insolation Control of Ice Sheets, North Hemisphere Ice Sheet History, Orbital-Scale interactions	CLO2
15 Hours/ Unit III	**Glacial/Deglacial & Human Climate Change:** The Last Glacial Maximum, Climate Change since the last Deglaciation, Millennial Oscillations of Climate **Human Climate Change:** Early Humans and Climate Change, Climate Change over the last 1,000 years, Climate Change since 1850, Current and Future Climate Change	CLO3
15 Hours/ Unit IV	**Techniques of Paleoclimate Research** Introduction to geochronology techniques, Theory and Applications of Luminescence Dating, Theory and Applications of Dendrochronology Dating, Essential field techniques used in Paleoclimate research, including remote sensing, surveying, mapping, and sediments/sample collections & coring.	CLO4

Transaction mode: Lecture, Demonstration, Problem solving, Tutorial, Seminar, Local field visit discussion. Tools used: PPT, video, animation movie, whatsapp and Expert's Video Conferencing lectures from JNU, New Delhi, PRL-Ahmedabad, IUAC-Delhi, BSIP-Lucknow

International to National to Local reachability: The course will be further enhanced with the advice of experts from following international to national organizations

- Queens University, Belfast, Northern Ireland (U.K.) (World Famous lab of Carbon Dating)
- Department of Marine, Earth and Atmospheric Sciences, North Carolina State University (US)
- Johannes Gutenberg University, Mainz (Germany)
- Physical Research Laboratory, Deptt. Of Space**,** Ahmedabad (India)
- Birbal Sahni Institute of Palaeosciences, DST, Lucknow (India)
- Jawaharlal Nehru University, New Delhi (India)
- National Institute of Hydrology, Roorkee (India)
- Inter-University Accelerator Centre (IUAC), New Delhi (India)

Suggested Readings:

- Cronin, Thomas M. (1999). Principles of Paleoclimatology. Columbia University Press.
- Gornitz, Vivien. (2009). Encyclopaedia of Paleoclimatology and Ancient Environments. Springer Netherlands.
- Gilbert, Loren (2012). Paleoclimatology: Understanding Past Climate.
- Bradley, Raymond S. (2014). Paleoclimatology: Reconstructing Climates of the Quaternary: Third Edition.

Course Title: Natural Hazards And Disasters	**Cr**	**T**	**P**	**Cr**
Course code: GEO 708	4	-	-	4

Total hours: 60

Course objective: This course aims to provide a comprehensive understanding of natural hazards, their assessment, and the role of Geospatial models in analyzing and mitigating geological, hydrometeorological, and environmental hazards, enabling students to contribute effectively to hazard assessment and management.

Course Learning Outcome (CLO):

On completion of this course, students will be able to:

CLO1: Students will gain proficiency in comprehending fundamental concepts of hazards, risk, vulnerability, and capacity, as well as understanding the zonation of hazards, multiple area hazards, and the context of disasters in relation to climate change and historical disasters in India.

CLO2: Students will acquire proficiency in exploring concepts and theories of earthquakes, landslides, glacial hazards, volcanic hazards, and mining hazards, along with familiarity with geoinformatics models for analyzing geological hazards.

CLO3: Students will develop proficiency in exploring hydro meteorological hazards such as floods, coastal hazards, cyclones, droughts, and lightning, and gain knowledge of geoinformatics models used for analyzing these hazards.

CLO4: Students will attain proficiency in understanding forest hazards, land and soil degradation, desertification, and pollution, including water, air, soil, solid waste dumping, and oil spills, along with knowledge of geoinformatics models for analyzing environmental hazards.

Hours/ Unit		**CLO**

15 Hours/ Unit I	**INTRODUCTION** Fundamental concepts of hazards, risk, vulnerability and capacity, Zonation of hazards, Multiple Area Hazards, Disasters in context of climate change, Disaster and National losses, historical perspective of disasters in India.	CLO1
15 Hours/ Unit II	**GEOLOGICAL HAZARDS** Earthquake, Landslide, Glacial hazards, Volcanic hazards, Mining hazards: land subsidence, mine flooding, coal mine fire, Geoinformatics models for Geological hazards	CLO2
15 Hours/ Unit III	**HYDRO METEOROLOGICAL HAZARDS** Flash floods, river floods, urban floods, Coastal hazards, Cyclones, tsunami, sea level rise, Drought, Lightening hazards, Geoinformatics models for Hydro meteorological hazards	CLO3
15 Hours/ Unit IV	**ENVIRONMENTAL HAZARDS** Forest hazards: deforestation, degradation and forest fire, Land & soil degradation, Desertification, Pollution: water, air, soil, solid waste dumping and oil spills, Geoinformatics models for Environmental hazards	CLO4

Mode of Transaction: methods of transaction are lecture, audio-video, discussion which will be followed in teaching using ppt, WhatsApp etc.

Suggested readings:

- P.S. Roy (2000). Natural Disaster and their mitigation. Published by Indian Institute of Remote Sensing (IIRS).
- Sdidmore A (2002) Environmental Modelling with GIS & Remote Sensing, Taylor & Francis
- Anji Reddy. M. (2004) Geoinformatics for environmental Management. B. S. Publication.
- Alexander David, Introduction in 'Confronting Catastrophe, Oxford University Press, 2000
- Andharia J. Vulnerability in Disaster Discourse, JTCDM, Tata Institute of Social Sciences Working Paper no. 8, 2008
- Blaikie, P, Cannon T. Davis I, Wisner B 1997. At Risk Natural Hazards Peoples' Vulnerability and Disasters, Routledge.
- Coppola P Damon, 2007. Introduction to International Disaster Management,
- Carter, Nick 1991. Disaster Management: A Disaster Manager's Handbook. Asian Development Bank, Manila Philippines,
- Cuny, F. 1983. Development and Disasters, Oxford University Press.
- Document on World Summit on Sustainable Development 2002.Govt. of India: Disaster Management Act 2005, Government of India, New Delhi.
- Government of India, 2009. National Disaster Management Policy,
- Gupta Anil K, Sreeja S. Nair. 2011 Environmental Knowledge for Disaster Risk Management, NIDM, New Delhi
- S Vaidyanathan, An Introduction to Disaster Management: Natural Disaster and Man Made Hazards.
- D R Khullar, JACS Rao, (2021), Environment & Disaster Management: Ecology, Climate Change & Bio-diversity,3rd Edition Edition, McGraw Hill Education India Private Limited.
- R.B. Singh (2006), Natural Hazards and Disaster Management, Rawat Publication.
- Bird Robinson (2020), Handbook of Natural Hazards and Disasters, Larsen & Keller, New York.

Course Title: Food Security	L	T	P	Cr
Course Code: GEO.709	4	-	-	4
Total Hour: 60 Hours				
Course objective: The main aim of this course is to provide students the basic understanding of food security concept and its various dimensions.				
Course Learning outcome: After completion of this course students will be able 1. to explain the basic concepts of food security, its dimensions and methods of measurements. 2. to have a better understanding of world patterns of food security; 3. Understand the inter-relationship with sustainable agriculture and climate change.				
Unit-I				
	• Millennium and Sustainable Development Goals • Food Security Policy in India with special focus on Public Distribution System and Food Security Act, 2013.			CLO1
Unit-II				
	• Concept of Poverty, Hunger and Malnutrition • World pattern of food security			CLO1& CLO3
Unit-III				
	• Sustainable Agriculture and Food Security • Climate Change and Food Security			CLO2
Unit-IV				
	• Millennium and Sustainable Development Goals • Food Security Policy in India with special focus on Public Distribution System and Food Security Act, 2013.			CLO3
Transaction mode: Lectures, discussion and presentation methods will be used for teaching.				
Suggested readings: 1. Asian Development Bank Agricultural, Food Security and Rural Development, Oxford University Press, New Delhi, 2010 2. Clay, E. (2002): Food Security: Concepts and Measurements", Paper for FAO Export Consultation on Trade and Food Security, Rome. 3. Food Insecurity Atlas of Rural India (2001), M.S. Swaminathan Research Foundation and World Food Programme. 4. FAO, WFP and IFAD. 2017. The State of Food Insecurity in the World 2017. Economic growth is necessary but not sufficient to accelerate reduction of hunger and malnutrition, Rome, FAO. 5. Von Braun, J. Agriculture, food security, nutrition and the Millennium Development Goals (Annual Report Essay). Washington, D.C: Washington, D.C, 2004. 88 p. **Suggested websites:** • Food and Agriculture Organisation (http://www.fao.org) • World Food Programme (http://www.wfp.org) • World Bank (http://www.worldbank.org/) • MS Research Foundation, India (https://www.mssrf.org/)				