MOTHER TERESA WOMEN'S UNIVERSITY

KODAIKANAL – 624102

SYLLABUS (2021-2022)

M.Phil GEOGRAPHY

(CHOICE BASED CREDIT SYSTEM)

(Full Time)

SYLLABUS, REGULATION AND SCHEME OF EVALUATION

MOTHER TERESA WOMEN'S UNIVERSITY
KODAIKANAL – 624102

M.Phil. Geography or Master of Philosophy in Geography is a postgraduate Geography course. Geography is the science that deals with the study of the Earth and its lands, features, inhabitants, and phenomena. A literal translation would be "to describe or write about the Earth". Four historical traditions in geographical research are the spatial analysis of natural and human phenomena (geography as a study of distribution), area studies (places and regions), a study of man-land relationship, and research in earth sciences. Nonetheless, modern geography is an all-encompassing discipline that foremost seeks to understand the Earth and all its human and natural complexities not merely where objects are, but how they have changed and come to be. Geography is divided into two main branches such as human geography and physical geography. This postgraduate degree is an important and career originating one. The duration of the course is two years but in some places, it is offered on a one-year basis. This syllabus will follow from academic year 2021-2022 onwards.

M.Phil. Geography Eligibility

- Aspiring candidates should have passed their Masters' degree with 55% in Geography and are eligible for this course but admission criteria may be different from place to place.

Programme Objectives

The course aims to develop general transferable skills and act as a bridge between first degree and PhD. Through the supervision process and the writing of an MPhil thesis students develop their skills in assessing contrasting theories, explanations and policies; collecting, critically judging, evaluating and interpreting varied forms of evidence; preparing maps and diagrams; employing various methods of collecting and analysing spatial and environmental information; combining and interpreting different types of evidence to tackle specific problems; and recognising the ethical and moral dimensions of study.

- To give students with relevant experience at a first-degree level the opportunity
- To carry out focused research in the discipline under close supervision;

- To give students the opportunity to acquire or develop skills and expertise relevant to their research interests;
- Permit close analysis of existing original research data.

Programme Outcomes

After completing M.Phil Programme in Geography, students will be able to

PO.1. Contribute knowledge of geography in response to issues in their specialized area to Identifying, interpreting and analyzing geographic problems and processes

PO.2. Prepare objective scientific approach to be able to address research problems in Applied Geography and allied fields and develop critical thinking and skills to analyze problems related to their research themes.

PO.3. Foster confidence among students enabling them to be able to interact with the respondents while collecting primary data by developing effective communications skills and ensure that the lessons are self-directed and lead to lifelong learning's.

PO.4. Defending and communicating facts, ideas and research findings via written, oral, graphical and quantitative outlets to carry out individual research work and originality in tackling and solving problems, and acted autonomously in the planning and implementation of research.

PO.5. A comprehensive understanding of techniques, and a thorough knowledge of the literature, together with a practical understanding of how research and enquiry are used to create and interpret in their field applicable to their own research.

PROGRAMME SPECIFIC OUTCOMES

PSO.1. To develop original thinking in the field of geography and geospatial sciences and carry out independent research of high quality in their specialized area

PSO.2. To evaluate and suggest optimal measures to solve multi-dimension geographic problems through geospatial techniques and communicate research findings in various forums at national andinternational level

PSO.3. Students acquire a greater understanding of the physical, socio-economic and demographic dimensions of geography and develop the capability of observation through field experience to identify the socio-environmental problem of the study area

PSO.4. Provide hands on training to use GIS/RS software; statistical software and GPS and develop communication powers for attending Seminars, workshops and writing scientificresearch papers for journals and books.

PSO.5. The students will be able to write effective reports and the dissertations prepared by students will enable them to carry their further research work.

PSO.6. Develop sensitivity towards societal responsibility and sustainable development and make them competent in applying their knowledge gained in different job sector.

Mother Teresa Women's University

FRAME WORK FOR M.Phil GEOGRAPHY
(Those Who Join June 2021 Onwards)

Paper No.	Paper Code	Course Title	Credits	Hours L/P	Continuous Internal Assessment (CIA)	End Semester Exam (ESE)	Total
SEMESTER – I							
1	M21GET11	Research Methodology	4	6/0	40	60	100
2	M21GET12	Quantitative Techniques in Geography	4	6/0	40	60	100
3	M21GET13	Professional Skills	4	6/0	40	60	100
		TOTAL	**12**	**18**	**-**	**-**	**300**
SEMESTER – II							
8	M21GET21/ M21GET22/ M21GET23/ M21GET24/ M21GET25/ M21GET26	Elective – I – Population Geography / Urban Studies / Water Resources Disaster Management / Land Evaluation / Agro Climatology	4	6/0	40	60	100
9	M21GED21	Dissertation	14 (12+2)				200
		TOTAL	**30**				**600**

SEMESTER – I

SEMESTER – I

RESEARCH METHODOLOGY

Credit: 4 **Course Code: M21GET11** **Hours: 6**

Learning Objectives:

- To understand some basic concepts of research and its methodologies.
- To identify appropriate research topics.
- To select and define appropriate research problem and parameters.
- Students should know the introduction of research, motivation in research, types of research, the significance of the research, research process and criteria of good research.
- Students should be familiar with ethical issues in educational research, including those issues that arise in using quantitative and qualitative research.

UNIT I **MEANING OF RESEARCH:** Need for scientific research – types of research – approach to geographical research: traditional and scientific – identification fields, sub fields and themes.

UNIT II **LOGIC IN RESEARCH:** Hypotheses, concepts and facts, principles, law, theory and their implications in geographical research – the science of geography – role of models – research trend in geography.

UNIT III **RESEARCH DESIGN:** Selection of the topic – statement of the problem – formulation of hypotheses, testing of hypotheses. – time schedule – literature survey and role of internet and bibliography.

UNIT IV **DATA ACQUISITION AND ANALYSIS:** Collection of data – sources of data: primary and secondary – structuring the data – data transformation – sampling techniques – interpret the results - quantitative revolution in geography.

UNIT V **THESIS WRITING:** Organization of the thesis: the preliminaries, the text and the reference materials – drafting of thesis: first, second and final – final evaluation – language and presentation (form and style) – writing of abstract, research papers for seminar and journal publications.

TEXT BOOKS:

1. *Anderson, J., Durston, B.H. and Poole, M., (1970). Thesis and Assignment Writing, Wiley Eastern Ltd., New Delhi.*
2. *Cooray, P.G., (1992). Guide to Scientific and Technical Writing, Hindagala, Srilanka.*

3. *Davis, J.C., (1986). Statistics and Data Analysis in Geology, John Wiley & Sons, New York.*
4. *Davis, W.K.D., (1972). The Conceptual Revolution in Geography, University of London Press Ltd., London.*
5. *Hammond, R. and McCullagh, P., (1978). Quantitative Techniques in Geography: An Introduction, Clarendon Press, Oxford.*

REFERENCE BOOKS:

1. *Hanag, L.L., and Lounsbury, J.F., (1971). Research Methods in Geography, Brown Company Publishers, Iowa.*
2. *Kothari, C.R., (1990). Research Methodology: Methods and Techniques, WishwaPrakasha, New Delhi.*
3. *Misra, R.P., Research Methodology: A Hand book, Concept Publishing Company, New Delhi.*

Learning Outcomes:

CO	After the completion of the course, students will be able to	Remarks
CO1	Students should be able to distinguish a purpose statement, a research question or hypothesis, a research objective and the utility of a hypothesis in scientific research.	**K2**
CO2	Students should be able to identify independent, dependent, features development of research and sampling design and its basic types.	**K2**
CO3	Students should be able to distinguish the interpretation, report-writing techniques and mechanics of writing of Report.	**K3**
CO4	Students should be able to design a good quantitative purpose statement and good quantitative research questions and hypotheses.	**K4**
CO5	Students will be able to understand the research problems, the link between quantitative research questions, data collection and how research questions are operationalized in educational practice.	**K5**

***K1** – Remember, **K2** – Understand, **K3** – Apply, **K4** – Analyze, **K5** – Evaluate*

Outcome Mapping:

PO/CO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**2**	**3**	**2**
CO2	**3**	**3**	**3**	**2**	**3**	**3**	**3**	**3**	**3**	**3**	**3**
CO3	**3**	**2**	**3**	**2**	**3**	**3**	**2**	**3**	**3**	**3**	**2**
CO4	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**2**	**3**	**3**
CO5	**2**	**3**	**2**	**2**	**3**	**2**	**3**	**3**	**3**	**3**	**3**

Strongly Correlating – 3, Moderately Correlating – 2, Weekly Correlating – 1, No Correlation – 0

SEMESTER – I

QUANTITATIVE TECHNIQUES IN GEOGRAPHY

Credit: 4 **Course Code: M21GET12** **Hours: 6**

Learning Objectives:

- To make generalizations concerning complex spatial patterns.
- To estimate the probability of outcomes for an event at a given location.
- To use samples of geographic data to infer characteristics for a larger set of geographic data (population).
- To determine if the magnitude or frequency of some phenomenon differs from one location to another.
- To learn whether an actual spatial pattern matches some expected pattern.

UNIT I **DEVELOPMENT OF GEOGRAPHICAL METHOD:** Science of geography – use of mathematics – transformation of space – perception and decision making in geography.

UNIT II **DATA COLLECTION:** Sources of data - approaching a geographical problem – Sampling – Data collection methods - geographical research projects – aim, method and implications – sources andproblems in collecting data.

UNIT III **DATA DESCRIPTION AND PRESENTATION:** Nature of geographical data - describing numerical distribution – point, line and shapes - classifying data – mapping distributions – mapping flows - symbols and graphs.

UNIT IV **DATA USE AND INTERPRETATION:** Probability - hypothesis testing – inferential tests - estimates form samples – correlation – regression

UNIT V **DATA PROCESSING:** Geographical data explosion – use of computers in data processing – spatial and non-spatial data – modern methods in spatial data collection, correction and verification – image processing – information extraction – GIS layers – multi criteria approach - information synthesis

TEXT BOOKS:

1. *FitzGerald Brain P, Development in Geographical method, Science in Geography – 1, Oxford University Press, Oxford, 1974.*

2. *Doaugherty Richard Data Collection, Science in Geography – 2, Oxford University Press, Oxford, 1974.*
3. *Davis Peter Data Description and Presentation, Science in Geography - 3, Oxford University Press, Oxford, 1974.*
4. *McCullagh Patrick, Data Use and Interpretation, Science in Geography – 4, Oxford University Press, Oxford, 1974.*

REFERENCE BOOKS:

1. *Lillesand T. M and R. Kiefer, Remote Sensing and Image Interpretation, Third Edition, John Wiley and Sons, New York, 1987.*
2. *Burrough P A and P A McDonnell, Principles of Geographical Information systems, Oxford University Press, London, 2000.*

Learning Outcomes:

CO	After the completion of the course, students will be able to	Remarks
CO1	Learn all the relevant techniques and methods for analyzing the data quantitatively through basic descriptive statistics to bivariate analysis; multivariate analysis both on analog and digital platform	**K2**
CO2	Apply the apt techniques for carrying out their research work	**K2**
CO3	Have the ability to assess the data manually or by using software	**K3**
CO4	Know the proper test required to validate the hypothesis	**K4**
CO5	Use proper methods to quantify the primary and secondary data	**K5**

***K1** – Remember, **K2** – Understand, **K3** – Apply, **K4** – Analyze, **K5** – Evaluate*

Outcome Mapping:

PO/CO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**2**	**3**	**2**
CO2	**3**	**3**	**3**	**2**	**3**	**3**	**3**	**3**	**3**	**3**	**3**
CO3	**3**	**2**	**3**	**2**	**3**	**3**	**2**	**3**	**3**	**3**	**2**
CO4	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**2**	**3**	**3**
CO5	**2**	**3**	**2**	**2**	**3**	**2**	**3**	**3**	**3**	**3**	**3**

Strongly Correlating – 3, Moderately Correlating – 2, Weekly Correlating – 1, No Correlation – 0

SEMESTER – II

SEMESTER – II

ELECTIVE – I – POPULATION GEOGRAPHY

Credit: 4 **Course Code: M21GET21** **Hours: 6**

Learning Objectives:

- This course introduces the history of population, methodology of population geography, sources & types of population data and spatial distribution of population with causative factors.
- Get knowledge about the various theories and concepts related to population
- The study of the population is an essential component in the planning of current various human related issues.
- They get knowledge about various kinds of demographic problems eg. Zero, under & decline population.
- Population Geography also deals with population policies in developed & developing countries

UNIT I **INTRODUCTION:** Nature, scope and significance of population geography – sources of population's data – Reliability of population data. Distribution and density of world population – Factors and pattern distribution.

UNIT II **DYNAMICS OF POPULATION:** Fertility – Its measures and determinants and world pattern – Mortality – Its measures and determinants and world trend – world population growth and its trend – Theories of population growth – Malthus, Ricardo and Marx – Migration types – Determinants– Consequences of migration – Laws of migration – Policies of migration

UNIT III **POPULATIONS COMPOSITION & CHARACTERISTICS:** Age, Sex, Rural, Urban, Occupation Education – Population resources relationship – Population resources region, Population policies.

UNIT IV Population – Development – Environment Interrelations – A Geographical Overview of World population – Population of India – Features and Trends – The Working population – The main occupation types and their Evolution.

UNIT V **POPULATION:** Impacts of development and disaster – Issues and Strategies – Disaster reduction strategies.

TEXT BOOKS:

1. *Chandna R.S – Geography of population concepts, Determinants and pattern, Kalyani Publishers, New Delhi, 1980.*

2. *Gosh,B.N –Population Geography, Sterling Publications.1987*
3. *Clark John. I. – Population Geography, Pergamon Press Ltd. Oxford,1981*
4. *Gosh, B.N – Population Geography, Sterling Publication, 1987*
5. *Chandna R.S Geography of Population Concepts, Determinants and patterns, Kalyani Publishers., NewDelhi 1980*
6. *ClarkJohn.I.-Population Geography Pergamum Press Ltd. Oxford 1981*

REFERENCE BOOKS:

1. *Beaujeu, Garnier, J. Geography of Population, Longman, London, 1966.*
2. *Bogue, D.J. Principles in Demography, John Wiley, New York, 1969*
3. *Chandna, R .C. Geography of Population, Kalyani Publ., New Delhi, 2000.*
4. *Clarke, J.I. Population Geography, Pergamon Press, Oxford,1972*
5. *Garnier, B. J.Geography of Population, Longman, London, 1970.*
6. *Ghosh, S. Settlement Geography, Orient Longman Ltd. , Kolkata, 1998.*

Learning Outcomes:

CO	After the completion of the course, students will be able to	Remarks
CO1	After this lesson the students can develop their understanding of the distribution of the population and its various characteristics including population growth, density, fertility, mortality, death rate, birth rate etc.	**K2**
CO2	They can understand the negative or positive effects of population distribution and growth in the society and can create awareness among the people of society regarding this.	**K2**
CO3	Students will be analyzing the global trend and patterns of population growth in developing countries and migration patterns.	**K4**
CO4	Students will be evaluating the population growth theory and migration theories.	**K4**
CO5	Students will understand the population policies and their importance in different countries.	**K5**

***K1** – Remember, **K2** – Understand, **K3** – Apply, **K4** – Analyze, **K5** – Evaluate*

Outcome Mapping:

PO/CO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**2**
CO2	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**
CO3	**3**	**2**	**3**	**2**	**3**	**2**	**2**	**3**	**3**	**3**	**3**
CO4	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**2**	**3**	**3**
CO5	**3**	**3**	**3**	**2**	**3**	**2**	**3**	**3**	**3**	**3**	**3**

Strongly Correlating – 3, Moderately Correlating – 2, Weekly Correlating – 1, No Correlation – 0

SEMESTER – II

ELECTIVE – I – URBAN GEOGRAPHY

Credit: 4 **Course Code: M21GET22** **Hours: 6**

Learning Objectives:

- Explaining the nature scope and development of urban geography, urbanization of in developed countries of India
- Describing the demographic structure and cities and population growth
- Identification the urban land uses and functional classification demographic of town basic and non-basic concept.
- Describing the urban expansion, umland demarcation, urban centers, rank size rules and central base theory. And land
- Explaining the urban problems, slumbs, pollution, transport, urban migration and land use changes.

UNIT I **BASIS CONCEPT:** Urban– Urban morphology – Urban hierarchy– Urbanization process conceptual modeling of urban process –Urban indicators and monitoring – Urban information system.

UNIT II **DATA SOURCE AND COLLECTION:** Platforms- scale and resolution – Scope and limitations – Interpretation from Areal and satellite images–GPS survey for urban data collection – Cadastral data – Mobile mapping lidar, digital image processing technique; Image classification– Image fusion – Feature extraction

UNIT III **URBAN MAPPING:** Urban infrastructure – Utility mapping – Change analysis – 2D and 3D – CBD – Fringe dynamics – Slums – Urban Sprawl.

UNIT IV **URBAN ADMINISTRATION:** Municipal and local administration – Electoral application – Solid waste management – Water supply and sanitation – Recreation site identification – Network analysis – Optimum route / Shortest route – Traffic and parking studies – Accident analysis – Vehicle tracking – Case studies.

UNIT V **URBAN MANAGEMENT:** Community based planning – Social service delivery – Environmental quality – Healthcare services – Homeland security – Emergency management and disaster response – Archaeology – location based services (LBS) – Virtual 3D city modeling and applications.

TEXT BOOKS:

1. *Friedmann, J. Life space and economic space: Contradictions in regional development, 1988.*

2. *Friedmann, J. (ed.) Life Space and Economic Space: Essays in Third World Planning, 2007.*
3. *Hardoy, J. E., Mitlin. D. Satterthwaite. D. Environmental Problems in Third World Cities, 1992.*
4. *Earthscan, Great Britain. Harold Carter, The Study of Urban Geography, Arnold, London, 1995*
5. *Harvey, D. Social Justice and the City. London: Edward Arnold, 1973.*
6. *Jensen, J.R. Remote Sensing of the Environment: An Earth Resource Perspective, Prentice-Hall, NJ, USA, 2007.*

REFERENCE BOOKS:

1. *Marcotullio, P. McGranahan. G. Scaling Urban Environmental Challenges: From Local to Global and Back, Earth scan, Great Britain, 2007.*
2. *Michael. Urban Geography: A Global Perspective, Taylor & Francis, Great Britain. Ramachandran R 1992, Urbanization and Urban Systems in India, Oxford University Press, Delhi, 2009.*
3. *Singh R Y, Geography of Settlement, Rawat Publication, Jaipur, 2002.*
4. *Singh S B, "New Perspectives in Urban Geography, M.D Publication, New Delhi, 1996.*

Learning Outcomes:

CO	After the completion of the course, students will be able to	Remarks
CO1	After the lesson students will able to knowledge development of urbanization.	**K2**
CO2	Student will be understand the world demographic structure of cities	**K2**
CO3	Students will learn and explain the functional classification towns, and basic and non-basic concept.	**K2**
CO4	Student will be understands the urban settlements and hierarchy of urban centers, central place theory.	**K4**
CO5	Students will learn urban problems, types of and pattern, distribution acquisition and characteristics.	**K5**

***K1** – Remember, **K2** – Understand, **K3** – Apply, **K4** – Analyze, **K5** – Evaluate*

Outcome Mapping:

PO/CO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	3	3	3	3	3	3	2	3	2
CO2	3	3	3	2	3	3	3	3	3	3	3
CO3	3	2	3	2	3	2	2	3	3	3	2
CO4	3	3	3	3	3	3	3	3	2	3	3
CO5	3	3	2	2	3	2	3	3	3	3	3

Strongly Correlating – 3, Moderately Correlating – 2, Weekly Correlating – 1, No Correlation – 0

SEMESTER – II

ELECTIVE – I – LAND EVALUATION

Credit: 4 **Course Code: M21GET23** **Hours: 6**

Learning Objectives:

1. They can know about terminology and concepts in land evaluation,
2. Students will have an understanding of the use of soil survey information for the assessment of land quality,
3. Will get knowledge in the various methods available for land suitability assessment,
4. Students will be use of land quality assessment as an input to decision making on optimization of sustainable land use and management.
5. Students will have an understanding of the land resources and Land capability

UNIT I **THE NATURE AND PRINCIPLES AND PROCESS OF LAND EVALUATION:** LE definition, Actors, need, aim, objectives land evaluation and land use planning, principles, land evaluation process, approaches, levels of detail: frame work, guidelines evaluations.

UNIT II **CONCEPTS:** Land use and land utilization Types, land resources survey: Physical, economical and social, levels of intensity, selection of land units (genetic and Parametric) Land qualities and land characteristics, land use requirements: crop requirements, management requirements and conservation requirements, land qualities and their assessment, matching of LUR and LQ land evaluation table, comparison of land use with land, land improvements, structure of the suitability classification.

UNIT III **GIS AND LAND RESOURCE SURVEY:** Land capability, physical land suitability, soil erosion and model, groundwater suitability, watershed and land use planning: database – thematic layers – weightage, ranking and rating scale – integration – suitability classification, decision making.

UNIT IV **GIS AND AGRICULTURAL LAND USE:** Crop suitability for irrigated and rain fed agriculture (Rice, Banana, Groundnut and cotton) agro climatic land suitability, forestry and grazing: database – thematic layers – weightage ,

ranking and rating scale – integration – suitability classification, decision making.

UNIT V **GIS AND NON – AGRICULTURAL LAND USE:** wildlife conservation, tourism development urban fringe development: database - thematic layers – weightage, ranking and rating scale – integration – suitability classification, decision making.

TEXT BOOKS:

1. *Christian, C.S., The concept of land units and land system, Proc. 9th pacific science congress, 20: 74 -81, 1957.*

Learning Outcomes:

CO	After the completion of the course, students will be able to	Remarks
CO1	Students will acquire knowledge regarding the land evaluation process and land use planning.	K2
CO2	To be able to analyses and interpret the land utilization types and land resources survey	K2
CO3	They understand about GIS and Agricultural land use	K2
CO4	Students will be learning about agro climatic land suitability	K3
CO5	Develop an idea about interpretation and application of remote sensing and GIS	K4

***K1** – Remember, **K2** – Understand, **K3** – Apply, **K4** – Analyze, **K5** – Evaluate*

Outcome Mapping:

PO/CO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	**3**	**3**	**3**	**2**	**2**	**2**	**3**	**3**	**3**	**3**	**3**
CO2	**3**	**3**	**2**	**3**	**3**	**2**	**2**	**3**	**2**	**2**	**2**
CO3	**3**	**2**	**2**	**2**	**3**	**3**	**3**	**2**	**2**	**2**	**2**
CO4	**3**	**2**	**3**	**3**	**3**	**2**	**2**	**3**	**3**	**3**	**3**
CO5	**3**	**3**	**3**	**3**	**2**	**2**	**3**	**2**	**2**	**3**	**2**

Strongly Correlating – 3, Moderately Correlating – 2, Weekly Correlating – 1, No Correlation – 0

SEMESTER – II

ELECTIVE – I – DISASTER STUDIES

Credit: 4 **Course Code: M21GET24** **Hours: 6**

Learning Objectives:

- To understand basic concepts in Disaster Management
- To Understand Definitions and Terminologies used in Disaster management
- To Understand Types and Categories of Disasters
- To Understand the Challenges posed by Disasters
- To understand Impacts of Disasters

UNIT I **DISASTER AND GIS:** Meaning and types of hazards, disasters and catastrophes- Disaster management; Earthquakes: causes and effects- measurements-earthquake zones of the world and in India-vulnerability and microzonation; Volcanoes: Causes and effects- Volcanic zones of the world and in India- Volcanic hazards; landslides: Causes and effects- landslide prone zones in India- GIS case studies for earthquake, Volcano and landslide.

UNIT II **CYCLONE AND FLOODING:** Cyclone: Origin and types- effect on land and sea -damage assessment; Flooding: Topography, landuse and flooding – space -time integration –GIS based parameters and layers – flood prone area analysis and management – risk assessment – GIS case studies for cyclones and floods.

UNIT III **DROUGHT AND DESERTIFICATION, DROUGHT:** Types – factors influencing drought – variable identification – vegetation index – land use / ground water level changes – soil erosion – delimiting drought prone areas – short term and long term effects – Desertification: processes – over utilization of water and land resources – GIS based management strategies– GIS case studies for drought and desertification.

UNIT IV **ANTHROPOGENIC DISASTERS:** Atmospheric disasters – ozone layer depletion – green house / global warming– acid rain – snow melt – sea level rice – related problems ; Nuclear, Chemical / Industrial and Mining

disasters: Types – consequences – major disaster of the world and India ; marine Disasters : Oil spill and chemical pollution – coastal erosion and deposition – coastal Zone management strategies – GIS case studies for anthropogenic disasters.

UNIT V BIOLOGICAL DISASTERS AND DISASTER MANAGEMENT ISSUES: Diseases and human health: Epidemics– disease spread– GIS analysis; ecological degradation– bio-diversity loss– population extinction– conservation; Biodiversity Gap Analysis; Coral / mangrove depletion– forest fire impacts– overlay analysis– GIS in environmental modeling– GIS case studies; Disaster Management: United Nations, Central and state Governments of India inDisaster Management– Institutional and Policy Framework-Disaster Prevention and Mitigation- Preparedness.

TEXT BOOKS:

1. *Abbott, P.L. Natural Disasters, Wm. C. Brown Publishing Co., New York, 1996.*
2. *Agarwal Gurcharan Singh S.K., and Inderjeet Sethi, The Degrading Environment(cause of Concern) Commonwealth Publication, New Delhi, 1993.*
3. *Agarwal, S.K. Global Warming and Climate Change, A.P.H. Publications, New Delhi, 2004.*
4. *Ghosh G.K. Disaster Management, A.P.H. Publishing Corporation, New Delhi, 2008.*
5. *Goel, S. L. Disaster Management. Deep & Deep Publication Pvt.Ltd, New Delhi, 2008.*

REFERENCE BOOKS:

1. *Kumaraswamy. K, GIS for Natural Resources and Disaster Management, Union offsetprinters, Tiruchirappalli, 2009.*
2. *Narayan, B. Disaster Management. A.P.H. Publishing Corporation, New Delhi, 2009.*
3. *Nicholas, K. Geohazards, Natural and human, Prentice hall of India, Delhi, 1995.*
4. *Saxena, H.M. Natural Disasters, Wm. C. Brown Publishing Co., New York, 1996.*
5. *Singh, R. B. Disaster Management, Rawat Publications. New Delhi, 2008.*

Learning Outcomes:

CO	After the completion of the course, students will be able to	Remarks
CO1	Describe Definitions and Terminologies used in Disaster Management, Types and Categories of Disasters	K2
CO2	Students will be able to challenges posed by Disasters and Impacts of	K2

	Disasters	
CO3	Describe various disasters that India is vulnerable to, and the hazard maps that enable them to visualize their vulnerabilities	K3
CO4	To understand about the Natural Disasters its Causes and Consequences	K4
CO5	To learn about Disaster Management and Mitigation.	K2

***K1** – Remember, **K2** – Understand, **K3** – Apply, **K4** – Analyze, **K5** – Evaluate*

Outcome Mapping:

PO/CO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	**3**	**2**	**3**	**2**	**2**	**3**	**3**	**2**	**2**	**2**	**3**
CO2	**3**	**3**	**3**	**3**	**2**	**3**	**2**	**3**	**3**	**3**	**2**
CO3	**3**	**2**	**2**	**3**	**3**	**2**	**3**	**3**	**2**	**2**	**3**
CO4	**3**	**2**	**3**	**2**	**3**	**2**	**2**	**3**	**3**	**3**	**3**
CO5	**3**	**3**	**2**	**3**	**2**	**3**	**3**	**3**	**2**	**2**	**2**

Strongly Correlating – 3, Moderately Correlating – 2, Weekly Correlating – 1, No Correlation – 0

SEMESTER – II

ELECTIVE – I – WATER RESOURCES

Credit: 4 **Course Code: M21GET25** **Hours: 6**

Learning Objectives:

- Identify the unique characteristics of freshwater;
- Describe, with a geographic perspective, how and why freshwater is distributed unevenly in space and time around the Earth;
- Explain the natural processes of aquatic ecosystems;
- Discuss why conflicts arise over freshwater;
- Compare how humans interact with aquatic ecosystems.

UNIT I **INTRODUCTION:** Hydrology – development of scientific of hydrology - importance of water – occurrence of water – hydrological cycle, precipitation – variation in precipitation distribution - analysis and interpretation of precipitation data - areal assessment of precipitation.

UNIT II **EVAPORATION AND EVAPOTRANSPIRATION:** Concept of potential evapotranspiration – factors controlling evapotranspiration - measurements of evaporation and evapotranspiration – computation – relationship between actual and potential evapotranspiration – spatial variation – interception process – determination of interception – variations.

UNIT III **GROUNDWATER:** Infiltration process – methods of determining infiltration rate – soil moisture – measurement – variations – groundwater – origin and occurrence – storage – types of aquifers – groundwater movement – groundwater level – groundwater quality – Mapping methods.

UNIT IV **WATER RESOURCES MANAGEMENT:** Approaches to planning and development of water resources – evaluation of surface water resources and groundwater – assessment of water quality for various uses – water supplies and utilization – problems – policies and management.

UNIT V **APPLICATION OF GIS IN WATER RESOURCES:** GIS for surface water modeling –groundwater modeling - flood plain mapping – water quality monitoring – water resource planning and management – Hydrologic Information System.

TEXT BOOKS:

1. *Ayodade, J. O., Tropical Hydrology and Water Resources, Macmillan Publishers, London, 1988.*
2. *Olson, R.E., A Geography of Water Resources, WMC Brown Company Publishers, Iowa, 1970.*
3. *Rao, K. L., India's Water Wealth: Its Assessment, Uses and Projections, Orient Longman, New Delhi, 1975.*
4. *Sewell, W.R.D., Geography of Water Resources, Prentice Hall, New York, 1975.*

REFERENCE BOOKS:

1. *Todd, D.K., Groundwater Hydrology, McGraw Hill Book Company, New York, 1959.*
2. *UNESCO, World Water Balance and Water Resources of the Earth, UNESCO, Leningrad, 1978.*
3. *Ward, R.C., Principles of Hydrology, McGraw- Hill Book Company, London, 1970.*
4. *Lyon, J.C. GIS for Water Resource and Watershed Management, Taylor and Francis, New York, 2003.*

Learning Outcomes:

CO	After the completion of the course, students will be able to	Remarks
CO1	Identify the causes of water scarcity.	K2
CO2	Distinguish between potential and actual water resources	K2
CO3	Justify the need for water conservation and management.	K3
CO4	Analyze the various inter- state disputes and riots among different communities.	K4
CO5	Identify the challenges facing water management in varied climate types around the world;	K2

***K1** – Remember, **K2** – Understand, **K3** – Apply, **K4** – Analyze, **K5** – Evaluate*

Outcome Mapping:

PO/CO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	**3**	**2**	**2**	**3**	**3**	**3**	**3**	**2**	**2**	**2**	**3**
CO2	**3**	**3**	**3**	**3**	**2**	**3**	**2**	**3**	**3**	**3**	**2**
CO3	**3**	**2**	**2**	**3**	**3**	**2**	**3**	**2**	**2**	**2**	**2**
CO4	**3**	**2**	**3**	**2**	**3**	**2**	**2**	**3**	**3**	**3**	**3**
CO5	**3**	**3**	**2**	**2**	**2**	**3**	**3**	**3**	**2**	**2**	**2**

Strongly Correlating – 3, Moderately Correlating – 2, Weekly Correlating – 1, No Correlation – 0

SEMESTER – II

ELECTIVE – I – AGRO CLIMATOLOGY

Credit: 4 **Course Code: M21GET216** **Hours: 6**

Learning Objectives:

- The effects of different climatic variables on agriculture
- Impact of climate change and global warming on agriculture
- Equipment's used in measurement of climatic variables and crop response to different climatic factors
- Different cropping systems in relation to climate and
- The relevance of irrigation practices to increase crop productivity

UNIT I **INTRODUCTION:** Remote sensing in Meteorology – Meteorological satellite characteristics – TIROS, NIMBUS, NOAA – TIROS N, SEASAT , GOES, METEOSAT, INSAT- Role of LANDSAT, SPOT and IRS – In collecting meteorological – Agricultural data – Atmospheric temperature retrieval techniques and surface radiation studies – Wind measuring techniques from satellite data.

UNIT II **RAINFALL MONITORING METHODS**: Satellite Remote Sensing System in Cloud classification– Rainfall monitoring methods: Cloud indexing method, Life –history method and Bio-spectral methods – Interpretation of Satellite meteorological images for weather and cyclones – Rainfall forecasting.

UNIT III **REMOTE SENSING IN DROUGHT ANALYSIS AND MAPPING:** Aridity and drought measurement methods – Estimation of soil moisture and evapotranspiration – Spectral behavior of different crops and vegetation in VIS, NIR, MIR, TIR and Microwave regions – Vegetation indices.

UNIT IV **REMOTE SENSING IN CROP IDENTIFICATION AND AREA ESTIMATION:** Sampling techniques – Vegetation indices and crop yield modeling – Monitoring – Assessing crop water availability – Crop stress assessment and monitoring – Nutrient estimation and management strategies.

UNIT V **WATER MANAGEMENT:** Demand and utilization pattern – Water shed – Command area – Precision agriculture – Crop calendar and crop suitability analysis – Suitable land use practices – Integration field and remote sensing data.

TEXT BOOKS:

1. *E.C. Barrett & L.F. Curtis, Introduction to Environment Remote Sensing, Chapman and Hall, London, 2000.*
2. *M.D. Steven and J.A. Clark, Applications of Remote sensing in Agriculture, 1998.*
3. *Bramdi, HenoyWillnois; Air Weather service, Satellite metrology, 1976*

REFERENCE BOOKS:

1. *Stanley Q. Kidder and Thomas, H. VonderHaar satellite Meterology –An Introduction, – oxlando, Academic Press, 1995.*
2. *The use of satellite data in rainfall monitoring, E.C. Barrett and D.W Martin, Academic Press, New York, 1995.*

Learning Outcomes:

CO	After the completion of the course, students will be able to	Remarks
CO1	Students will be able to Agriculture to the importance of climate to agriculture	K2
CO2	The student knows the main environmental factors and their interactions with agricultural, forestry and natural ecosystems, is able to measure and evaluate them	K5
CO3	Students have known how to calculate energy balance and climatology and the principles that govern the climate allows and understand the ongoing climate change.	K3
CO4	Students have knowledge of possible mitigation and adaptation techniques in the new evolving climate situation.	K5
CO5	A student also knows the main applications of agro-meteorology in particular environments, such as greenhouse, urban green, urban gardens and other innovative mitigation techniques of climate change.	K3

***K1** – Remember, **K2** – Understand, **K3** – Apply, **K4** – Analyze, **K5** – Evaluate*

Outcome Mapping:

PO/CO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	**3**	**3**	**2**	**3**	**3**	**3**	**2**	**3**	**3**	**2**	**3**
CO2	**3**	**2**	**3**	**3**	**2**	**3**	**2**	**3**	**3**	**3**	**2**
CO3	**3**	**2**	**3**	**2**	**2**	**2**	**3**	**2**	**2**	**2**	**3**
CO4	**3**	**3**	**3**	**3**	**3**	**2**	**2**	**3**	**3**	**3**	**3**
CO5	**3**	**3**	**2**	**2**	**2**	**3**	**3**	**3**	**2**	**2**	**2**

Strongly Correlating – 3, Moderately Correlating – 2, Weekly Correlating – 1, No Correlation – 0