SARDAR PATEL UNIVERSITY
VALLABH VIDYANAGAR
Programme – MSc Geoinformatics
(Under Choice Based Credit Scheme)

M. Sc. (Geoinformatics) – 2nd Semester Syllabus

Effective From: 2017 - 2018

Paper No.	Paper Title
PS02CGIN21	Digital Image Processing
PS02CGIN22	Spatial Analysis and Modeling
PS02CGIN23	Java Programming
PS02CGIN24	Web Programming
PS02CGIN25	Practical based on PS02CGIN21, PS02GCIN23 & PS02GCIN24
PS02EGIN21 OR PS02EGIN22	Elective Subjects

Elective:

PS02EGIN21 Natural Resources Management
PS02EGIN22 Disaster Management

Paper No.: PS02CGIN21
Paper Title: DIGITAL IMAGE PROCESSING

Unit 1 Introduction to Computer Graphics & Applications

Graphs and Charts, Data Visualizations, Image Processing, Raster Scan Systems, Basic 2-D Geometric Transformations, Matrix Representations, 2-D Composite Transformations, Similarity Transformations, Arithmetic Transformations

Unit 2 Image Processing Fundamentals

Image Processing, Steps in Digital Image Processing, Components of an Image Processing System, uses of Digital Image Processing, Elements of Visual interpretation, Image Sensing and Acquisition, Image Sampling and Quantization, Mathematical Tools Used in Digital Image Processing

Unit 3 Intensity Transformation & Spatial Filtering

Background, Basic Intensity Transformation Functions, Histogram Processing, Fundamentals of Spatial Filtering, Smoothing Spatial Filters, Sharpening Spatial Filters, Basics of Filtering in the Frequency Domain, Image Smoothing Using Frequency Domain Filters, Image Sharpening Using Frequency Domain Filters, Fourier Transform Functions

Unit 4 Image Compression & Image Segmentation

Fundamentals, Lossy-Lossless Image Compression, Compression Methods (Huffman Coding, Run-Length Coding, Block Transform Coding, MrSID)
Fundamentals, Thresholding, Point, Line and Edge Detection, Supervised & Unsupervised Classification

Reference Books:

1. Digital Image Processing, Rafael C. Gonzalez and Richard E. Woods, 3rd Edition, Pearson Education
2. Image Processing : Principles, Applications and Inventions, Chandan Koner, Himadri Nath, Moumita Ghose, Biswajit Mondal, Sara Book Publication
3. GIS Processing of Geocoded Satellite Data, Jonathan Willams, Springer
4. Digital Image Processing and Analysis, Scott E Umbaugh, CBC Press

Paper No.: PS02CGIN22
Paper Title: SPATIAL ANALYSIS & MODELING

Unit 1 Statistical Surface & 3-D Analysis
Surface Mapping, Linear & Non-linear Interpolation, Higher Level GIS Objects
Digital Elevation Model, Contours and TIN Model for 3-D Data
Slope, Aspect, Visibility, Viewshed Analysis, Cut & Fill Analysis

Unit 2 Grid Analysis & Network Analysis
Basic Raster Operations, Raster to Vector Conversion, Vector to Raster Conversion
Location & Allocation Analysis, Shortest Path & Route Analysis

Unit 3 Spatial Arrangement & Comparing Maps
Gravity Model, Nearest Neighbor Analysis, Thiessen Polygons Analysis, CAD Type Overlay, Cartographic Overlay Analysis, Spatial Data Mining

Unit 4 Cartographic Modeling
Model Components, Types of Cartographic Models, Modeling Flowchart, Model Implementation & Verification

Reference Books:

1. Geographic Information Systems, Michael N. DeMers , Wiley India, 3rd Edition, 2011
2. Geographic Information Systems and Science, Longley, Goodchild, Maguire, Rhinde 2nd Ed. Wiley, 2005
3. Spatial Analysis and Modeling in Geographical Transformation Process-GIS-based Applications, Murayama, Yuji, Thapa, Rajesh Bahdur, Springer

Paper No.: PS02CGIN23
Paper Title: JAVA PROGRAMMING

Unit 1 Introduction to Java

Origin & Features of Java language
Java development Kit & Java packages
Class, Object, Memory management, Polymorphism in Java, Inheritance, Overloading and overriding in Java.

Advanced Programming Concepts

Exception handling
I/O & File management
Multithreading
JDBC

Unit 2 Implementation Advanced Programming Concepts using Visual Programming

Introduction
Event handling
Visual programming using AWT
Advanced Visual programming using JFC

Unit 3 Web Programming

Applets design
Servlets / JSP
Network programming

Unit 4 Advanced Concepts-I & II

Java Beans
RMI & CORBA
Java mail API

Reference Books:

1. Patrick Naughton: Complete Reference – TMH
2. Daniel Joshi and Paul Vorobeiu: The Java 1.1 Programmer – Comdex Times
3. C. Thomas: Introduction to Object Oriented Programming with Java - TMH, Naughton: The Java Hand Book – TMH

Paper No.: PS02CGIN24
Paper Title: WEB PROGRAMMING

Unit 1 Basics of Internet

Hardware Components
Protocols, Browsers, Mail Clients, Web Servers, Mail Servers

HTML Fundamentals

Text Formatting Tags, Physical Tags, Forms Tags, Table Tags, Frame Tags etc.

DHTML Fundamentals

Introduction to DHTML
Introduction to CSS, Creating and Managing Styles
Website Layout and Design

Unit 2 Introduction to JavaScript

Difference between Client-Side Vs Server-Side JavaScript
Fundamental JavaScript Directives
Server Side JavaScript
JavaScript Objects

Open Source

Introduction to Open Source
Advantages and Capabilities of OpenSource
PHP Vs JSP and ASP
Adding PHP to HTML, Introduction to Apache
Applications of OpenSource like Drupal, WordPress, Cake PHP(CMS, Joomla, MVC) etc.

Unit 3 PHP Programming

Syntax and Variables
Control and Functions
Arrays, Array and String Functions
Regular Expression, Passing information between pages

Unit 4 Working with MySQL

Configuring PHP for Database
Introduction to MySQL
MySQL functions
Executing System Calls (Select, Insert, Fetch, Update, Delete)
Database Connectivity
Retrieving Data from Forms
Introduction to Session and Cookies

Reference Books:

1. Ivan Baryons: HTML, DHTML, JavaScript, CGI & Perl
2. O'reilly Publication : PHP Cookbook
3. Wiley Publication : PHP and MySQL

Paper No.: **PS02CGIN25**
Paper Title: **Practical Based on PS02CGIN21, PS02CGIN23 and PS02CGIN24**

M. Sc. (Geoinformatics) – 2nd Semester Syllabus

Paper No.: **PS02EGIN21**
Paper Title: **NATURAL RESOURCES MANAGEMENT**

Unit 1 **Land Resources & Management**

Landuse classification, land degradation, soil erosion, desertification, sustainable development of Land resource, Change detection & Suitability analysis
GIS data needs, GIS database design for land resources management, decision rules & GIS modeling for land resources management

Unit 2 **Water Resources**

Types of water resources, surface & ground water conservation, sustainable development of water resource, Change detection & Suitability analysis
GIS data needs, GIS database design for water resources management, decision rules & GIS modeling for water resources management

Unit 3 **Mineral Resources**

Types of mineral resources, availability and distribution, life cycle of mineral resource , four PBT Metals and its adverse effect modeling using GIS

Unit 4 **Environment Impact Assessment on NR**

GIS data needs, GIS database design, decision rules, GIS based modeling for EIA

Reference Books:

1. GIS Principle, Techniques, Management and Applications by Paul Longly & M F Goodchild, 2nd Edition, John Wiley & Sons Inc.
2. Report of working group on NRM, 11th Plan Planning Commission of India, 2007
3. www.nrdms.gov.in
4. Website of Ministry of Water Resources
5. Website of Ministry of Environment , Forest and Climate Change

Paper No.: PS02EGIN22
Paper Title: DISASTER MANAGEMENT

Unit 1 Introduction to Disaster and Types of Disaster

Understanding the concepts and definitions of Disaster, hazard, Vulnerability, Risk, Capacity – Disaster and Development, and Disaster management
Geological disasters (earthquakes, landslide, tsunami)
Hydro-Meteorological Disasters (floods, cyclones
Technological disasters
Global Disaster trends – Emerging risks of disasters, Climate change and Urban Disasters

Unit 2 Pre-Disaster Management

Paradigm shift in Disaster Management, Pre- Disaster – Risk Assessment and Analysis, Risk Mapping, Zonation

Unit 3 Disaster Mitigation

Structural and non structural mitigation of disasters
Prevention and Early Warning System
Applications of Science Technology for Disaster management & Mitigation
Geoinformatics in Disaster management (RS, GIS, GPS)
Disaster Communication System (Early Warning and its Dissemination)

Unit 4 Disaster Management in India

Disaster profile of India – Mega Disasters of India and Lessons Learnt Disaster management act 2005 – Institutional and Financial Mechanism National Policy on Disaster Management, national Guidelines and Plans on Disaster management, Role of Government, Non government Agencies, S & T Institutions for Disaster Management in India

Reference Books:

1. Disasters in India studies of ggrim reality, Anu kapur et. Al, Rawat Publisher
2. An overview on natural and manmade disasters and their reduction, R. K. bhandani