Nagindas Khandwala College (Autonomous)

Name of the Programme: M.Sc. in Geoinformatics

Programme Code: PMSGI

PROGRAMME OBJECTIVES

PO–1: Learners will be able to recognize the basic concepts of Remote Sensing, Geoinformatics, Geography, Mathematics, Computers, Statistics and Research.

PO – 2: Learners will be able to explain Trigonometric functions, Matrix, basics of projections, vector and raster analysis.

PO– 3: Learners will be able to apply the basics of computer programming, cartography, GIS technology with health care.

PO–4: Learners will be able to enhance the ability to use free data, associate GIS with GPS and LiDAR with Remote Sensing.

PO–5: Learners will be able to access the changing phase of earth surface and to evaluate the application of GIS in data base management system.

PO –6: Learners will be able to explain programming with Python, access maps prepared by NATMO and justify the output of spatial data analysis and extract data from data base.

PROGRAMME OUTCOMES

After completing two years of Masters in Geoinformatics (M.Sc) program, the learners will:

PO–1: To recognize the basic concepts of Remote Sensing, Geoinformatics, Geography, Mathematics, Computers, Statistics and Research.

PO – 2: To explain Trigonometric functions, Matrix, basics of projections, vector and raster analysis.

PO– 3: To apply the basics of computer programming, cartography, GIS technology with health care.
PO–4: To enhance the ability to use free data, associate GIS with GPS and LiDAR with Remote Sensing.

PO–5: To access the changing phase of earth surface and to evaluate the application of GIS in data base management system.

PO –6: To explain programming with Python, access maps prepared by NATMO and justify the output of spatial data analysis and extract data from data base.

Semester I

Paper 101: Fundamentals of Remote Sensing

2011PGIFRS

Course Objectives:

1. To introduce basic concepts of remote sensing
2. To explain the various platforms, types of senor and remotely sensed products
3. To apply the technology of aerial photography for analysis
4. To analyze the various satellite imageries and aerial photographs
5. To develop understanding of GPS and its functioning
6. To assess real time projects using the relevant technology

Course Outcome:

1. CO 1: Learners will be able to recognize the basic concepts of remote sensing (Level :Knowledge)
2. CO 2: Learners will be able to explain the various platforms, types of senor and remotely sensed products (Level : Comprehension)
3. CO 3: Learners will be able to apply the technology of aerial photography for analysis (Level : Application)
4. CO 4: Learners will be able to analyze the various satellite imageries and aerial photographs (Level : Application)
5. CO 5: Learners will be able to develop understanding of GPS and its functioning (Level : Synthesis)
6. CO 6: Learners will be able to assess real time projects using the relevant technology (Level : Evaluation)

102: Fundamentals of the Earth's System

2012PGIFES

Course Objectives:

1. To introduce basic concepts and components of basic geography

2. To explain the role of climate, weathering process, landforms and soil on Earth

3. To apply knowledge of the main components of the Earth system

4. To analyze the basic understanding of the Earth as a holistic system

5. To develop skills to understand the climate and its effects and soil formation

6. To assess the changing face of Earth's surface as a result of landform development

Course Outcome:

1. CO 1: Learners will be able to recognize the basic concepts basic concepts and components of basic geography (Level :Knowledge)
2. CO 2: Learners will be able to explain the role of climate, weathering process, landforms and soil on Earth (Level : Comprehension)
3. CO 3: Learners will be able to apply knowledge of the main components of the Earth system (Level : Application)
4. CO 4: Learners will be able to analyze the basic understanding of the Earth as a holistic system (Level : Application)
5. CO 5: Learners will be able to develop skills to understand the climate and its effects and soil formation (Level : Synthesis)
6. CO 6: Learners will be able to assess the changing face of Earth's surface as a result of landform development (Level : Evaluation)

Paper 103: Fundamentals of Mathematics

2013PGIFMA

Course Objectives:

1. To introduce the concepts Trigonometric functions, Matrix and Determinants

1. To explain numerical and vector algebra
2. To apply knowledge of fundamental concepts of Elementary Mathematics and Matrices & Determinants   and their applications
3. To enhance the ability of using mathematics in analyzing the real world problems
4. To develop skills of applying advanced numerical methods
5. To assess data with the help of matrices

Course Outcome

1. CO 1: Learners will be able to recognize the concepts of Trigonometric functions, Matrix and Determinants (Level: Knowledge)

2. CO 2: Learners will be able to explain numerical and vector algebra (Level : Comprehension)
3. CO 3: Learners will be able to apply fundamental concepts of Elementary Mathematics and Matrices & Determinants   and their applications (Level : Application)
4. CO 4: Learners will be able to enhance their ability of using mathematics in analyzing the real world problems (Level : Application)

5. CO 5: Learners will be able to develop skills of applying advanced numerical methods (Level : Synthesis)
6. CO 6: Learners will be able to assess data with the help of matrices (Level : Evaluation)

Paper 104: Fundamentals of Computers

2014PGIFCO

Course Objectives:

1. To introduce the basics of computers and related terminology

2. To explain the basic working of an operating system

3. To apply the basics of computer programming

4. To enhance the ability to use the style sheets and presentation tools

5. To develop skills of debugging and executing a program.

6. To assess written Python code and write the same to solve problems

Course Outcome

1. CO 1: Learners will be able to recognize t the basics of computers and related terminology (Level :Knowledge)
2. CO 2: Learners will be able to explain the basic working of an operating system (Level : Comprehension)
3. CO 3: Learners will be able to apply the basics of computer programming (Level : Application)
4. CO 4: Learners will be able to enhance the ability to use the style sheets and presentation tools (Level : Application)
5. CO 5: Learners will be able to develop skills of debugging and executing a program. (Level: Synthesis)
6. CO 6: Learners will be able to assess written Python code and write the same to solve problems (Level : Evaluation)

105: Tools and Techniques in Geoinformatics I

2015PGITTG

Course Objectives:

1. To introduce the basics of remote sensing and the concepts of projections and scales

2. To explain and interpret the remotely sensed data

3. To apply the basics of cartography

4. To enhance the ability to use free data from BHUVAN website

5. To develop skills to construct appropriate maps and diagrams

6. To assess maps prepared by NATMO

Course Outcome

1. CO 1: Learners will be able to recognize the basics of remote sensing and the concepts of projections and scales (Level: Knowledge)

2. CO 2: Learners will be able to explain and interpret the remotely sensed data (Level : Comprehension)

3. CO 3: Learners will be able to apply the basics of cartography (Level : Application)

4. CO 4: Learners will be able to enhance the a the ability to use free data from BHUVAN website (Level : Application)

5. CO 5: Learners will be able to develop skills to construct appropriate maps and diagrams (Level: Synthesis)

6. CO 6: Learners will be able to assess maps prepared by NATMO (Level : Evaluation)

106: Tools and Techniques in Geoinformatics II

2016PGITTG

Course Objectives:

1. To illustrate the application software and operating systems

2. To explain the use of internet for geographical data sets

3. To apply the basics of MS-Office

4. To enhance the ability to use Linux commands

5. To develop web pages and to write computer programs

6. To assess the programs prepared using Python

Course Outcome

1. CO 1: Learners will be able to illustrate the application software and operating systems (Level :Knowledge)

2. CO 2: Learners will be able to explain the use of internet for geographical data sets (Level : Comprehension)

3. CO 3: Learners will be able to apply the basics of MS-Office (Level : Application)

4. CO 4: Learners will be able to enhance the ability to use Linux commands (Level : Application)

5. CO 5: Learners will be able to develop web pages and to write computer programs (Level: Synthesis)

6. CO 6: Learners will be able to assess the programs prepared using Python (Level : Evaluation)

Semester – II

Paper 201: Introduction to Geo Informatics

2021PGIINGI

Course Objectives:

1. To define the fundamental concepts of remote sensing
2. To explain the various remote sensing platforms and sensors
3. To construct spatial data models in GIS
4. To associate GIS with GPS
5. To compare between satellite imageries, aerial photographs, and GIS outputs
6. To justify the reasons for the existing land uses from the imageries, photographs and other maps

Course Outcome:

1. CO 1: Learners will be able to define the fundamental concepts of remote sensing like electromagnetic spectrum, aerial photography, principles of photogrammetry, etc. (Level : Knowledge)
2. CO 2: Learners will be able to explain the various remote sensing platforms and sensors, basics of projections, datum and coordinate reference system (Level : Comprehension)
3. CO 3: Learners will be able to construct spatial data models in gis for solution modeling (Level : Application)
4. CO 4: Learners will be able to associate gis with GPS and work with them together (Level : Analysis)
5. CO 5: Learners will be able to compare between satellite imageries, aerial photographs, and gis outputs for better results (Level : Synthesis)
6. CO 6: Learners will be able to justify the reasons for the existing land uses from the imageries, photographs and other maps (Level : Evaluation)

Paper 202: Spatial Analysis on Statistical Methods

2022PGISASM

Course Objectives:

1. To define the basics of spatial analysis using statistics

2. To explain the various raster and vector analysis
3. To construct a network model and analyze it
4. To associate spatial modelling to real world problems
5. To compare between several datasets
6. To justify the output of spatial data analysis

Course Outcome:

1. CO 1: Learners will be able to define the basics of spatial analysis using statistics (Level: Knowledge)
2. CO 2: Learners will be able to explain the various raster and vector analysis (Level : Comprehension)
3. CO 3: Learners will be able to construct a network model and analyze it (Level : Application)
4. CO 4: Learners will be able to associate spatial modelling to real world problems (Level : Analysis)
5. CO 5: Learners will be able to compare between several datasets (Level : Synthesis)
6. CO 6: Learners will be able to justify the output of spatial data analysis (Level : Evaluation)

Paper 203: Digital Image Processing

2023PGIDIP

Course Objectives:

1. To define the basics of image processing through digital platforms

2. To explain the basics of remote sensing
3. To construct an image with supervised classification
4. To associate concept of LiDar with remote sensing
5. To compare between images and interpret them
6. To justify the output of classified imageries

Course Outcome:

1. CO 1: Learners will be able to define the basics of image processing through digital platforms (Level : Knowledge)

2. CO 2: Learners will be able to explain the basics of remote sensing (Level : Comprehension)
3. CO 3: Learners will be able to construct an image with supervised classification (Level : Application)
4. CO 4: Learners will be able to associate concept of LiDar with remote sensing (Level : Analysis)
5. CO 5: Learners will be able to compare between images and interpret them (Level : Synthesis)
6. CO 6: Learners will be able to justify the output of classified imageries (Level : Evaluation)

Paper 204: Programming with Python

2024PGIPPY

Course Objectives:

1. To define the basics of computer systems and internet

2. To explain programming using Python
3. To develop Python programs for raster and vector data processing
4. To associate geographical data sets with Python code
5. To compare between various image geometries using Python programming
6. To assess histograms, attribute tables and virtual raster format

Course Outcome:

1. CO 1: Learners will be able to define the basics of computer systems and internet (Level: Knowledge)

2. CO 2: Learners will be able to explain programming using Python (Level: Comprehension)

3. CO 3: Learners will be able to develop Python programs for raster and vector data processing (Level: Application)

4. CO 4: Learners will be able to associate geographical data sets with Python code (Level: Analysis)

5. CO 5: Learners will be able to compare between various image geometries using Python programming (Level: Synthesis)

6. CO 6: Learners will be able to assess histograms, attribute tables and virtual raster format (Level: Evaluation)

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205: Tools and Techniques in Geoinformatics III

2025PGITTG

Course Objectives:

1. To define the basics of statistical analysis

2. To explain techniques of spatial analysis

3. To develop understanding of statistical tools and their application

4. To associate vector layer operations to geometrical tools
5. To compare between various data sources and maps
6. To assess spatial data with the help of various spatio-statistical tools

Course Outcome:

1. CO 1: Learners will be able to define the basics of statistical analysis (Level : Knowledge)

2. CO 2: Learners will be able to explain techniques of spatial analysis (Level : Comprehension)

3. CO 3: Learners will be able to develop understanding of statistical tools and their application (Level : Application)

4. CO 4: Learners will be able to associate vector layer operations to geometrical tools (Level : Analysis)
5. CO 5: Learners will be able to compare between various data sources and maps (Level : Synthesis)
6. CO 6: Learners will be able to assess spatial data with the help of various spatio-statistical tools (Level : Evaluation)

206: Tools and Techniques in Geo Informatics IV

2026PGITTG

Course Objectives:

1. To define the basics of computer programming in Python.

2. To explain techniques of file handling in Python.

3. To develop understanding of GIS data processing using Python libraries

4. To associate spatial data with python modules

5. To compare between the functioning of OSR and pyproj

6. To assess spatial data with the help of python codes and map algebra

Course Outcome:

1. CO 1: Learners will be able to define the basics of computer programming in Python (Level : Knowledge)

2. CO 2: Learners will be able to explain techniques of file handling in Python (Level : Comprehension)
3. CO 3: Learners will be able to develop understanding of GIS data processing using Python libraries (Level : Application)
4. CO 4: Learners will be able to associate spatial data with python modules (Level : Analysis)
5. CO 5: Learners will be able to compare between the functioning of OSR and pyproj (Level : Synthesis)
6. CO 6: Learners will be able to assess spatial data with the help of python codes and map algebra (Level : Evaluation)

Semester - III

301: Research Methodology

2131PGIRMY

Course Objectives:

1. To acknowledge students with the basics of research and its methodology
2. To interpret the results with the help of research hypothesis and its testing
3. To compute and analyze geographic data
4. To distinguish between the different levels of measurement
5. To compile a research report
6. To justify the research with the help of statistical measures

Course Outcome:

1. CO 1: Learners will be able to acknowledge students with the basics of research and its methodology (Level : Knowledge)
2. CO 2: Learners will be able to interpret the results with the help of research hypothesis and its testing (Level : Comprehension)
3. CO 3: Learners will be able to compute and analyze geographic data (Level : Application)
4. CO 4: Learners will be able to distinguish between the different levels of measurement (Level : Analysis)
5. CO 5: Learners will be able to compile a research report (Level : Synthesis)
6. CO 6: Learners will be able to justify the research with the help of statistical measures (Level : Evaluation)

Paper 302: Advances in Remote Sensing and Advanced Techniques in Spatial Data Processing

2132PGIARST

Course Objectives:

1. To recognize basic concepts related to remote sensing and spatial data processing

2. To explain the importance of spectral indices of objects
3. To apply the cues for image interpretation effectively
4. To analyse environmental indicators through remotely sensed data
5. To develop image sequence analysis
6. To assess natural hazards through remotely sensed data

Course Outcome:

1. CO 1: Learners will be able to recognize basic concepts related to remote sensing and spatial data processing (Level: Knowledge)

2. CO 2: Learners will be able to explain the importance of spectral indices of objects (Level : Comprehension)
3. CO 3: Learners will be able to apply the cues for image interpretation effectively (Level : Application)
4. CO 4: Learners will be able to analyse environmental indicators through remotely sensed data (Level : Application)
5. CO 5: Learners will be able to develop image sequence analysis (Level : Synthesis)
6. CO 6: Learners will be able to assess natural hazards through remotely sensed data (Level : Evaluation)

303: Advances in GIS

2133PGIGIS

Course Objectives:

1. To learn application based content in the field of GIS

2. To explain the importance of spatial data mining
3. To apply the recent trends in the field of GIS
4. To analyze urban environment with the help of GIS tools
5. To develop theoretical understanding for hands on experience
6. To assess spatial data using cartographic animation

Course Outcome:

1. CO 1: Learners will be able to learn application based content in the field of GIS (Level :Knowledge)
2. CO 2: Learners will be able to explain the importance of spatial data mining (Level : Comprehension)
3. CO 3: Learners will be able to apply the recent trends in the field of GIS (Level : Application)
4. CO 4: Learners will be able to analyze urban environment with the help of GIS tools (Level : Application)
5. CO 5: Learners will be able to develop theoretical understanding for hands on experience (Level : Synthesis)
6. CO 6: Learners will be able to assess spatial data using cartographic animation (Level : Evaluation)

Paper 304 - Web Designing

2134PGWDS

Course Objectives:

1. To recognize the basics of web designing

2. To explain the importance of java scripts in web designing
3. To apply the event handlers, click events and mouse events of Java script
4. To analyze various domains and create one of their own
5. To develop style sheets
6. To assess image mapping from the users' perspective

Course Outcome:

1. CO 1: Learners will be able to recognize the basics of web designing (Level: Knowledge)

2. CO 2: Learners will be able to explain the importance of java scripts in web designing (Level : Comprehension)
3. CO 3: Learners will be able to apply the event handlers, click events and mouse
4. events of Java script (Level : Application)
5. CO 4: Learners will be able to analyze various domains and create one of their own (Level : Application)
6. CO 5: Learners will be able to develop style sheets (Level : Synthesis)
7. CO 6: Learners will be able to assess image mapping from the users' perspective (Level : Evaluation)

(Paper 305 – Projects)

2135PGIPRJ

Semester - IV

401 - Geo-informatics and Health Care

2141PGIGHC

Course Objectives:

1. To recognize the relationship between healthcare and Geoinformatics
2. To explain the importance of healthcare database for Geoinformatics
3. To apply the GIS technologies for healthcare
4. To analyze spatial and non-spatial data for health care
5. To develop a model for storing spatial data related to healthcare
6. To assess the healthcare models in GIS

Course Outcome:

1. CO 1: Learners will be able to recognize the relationship between healthcare and Geoinformatics (Level: Knowledge)

2. CO 2: Learners will be able to illustrate the importance of healthcare database for Geoinformatics (Level : Comprehension)
3. CO 3: Learners will be able to apply the GIS technologies for healthcare (Level : Application)
4. CO 4: Learners will be able to compute spatial and non-spatial data for health care (Level : Application)
5. CO 5: Learners will be able to develop a model for storing spatial data related to healthcare (Level : Synthesis)
6. CO 6: Learners will be able to assess the healthcare models in GIS- the plume model and the star model (Level : Evaluation)

402 - Database Management Systems

2142PGIDMS

Course Objectives:

1. To recognize the need for the database management system

2. To understand the data models
3. To apply DBMS knowledge to create functions
4. To differentiate between DBMS and RDBMS

5. To create an E-R diagram for the given scenario
6. To execute the queries and extract data from a database

Course Outcome:

1. CO 1: Learners will be able to recognize the need for the database management system (Level :Knowledge)
2. CO 2: Learners will be able to understand the data models (Level : Comprehension)
3. CO 3: Learners will be able to apply DBMS knowledge to create functions (Level : Application)
4. CO 4: Learners will be able to differentiate between DBMS and RDBMS (Level : Application)
5. CO 5: Learners will be able to create an E-R diagram for the given scenario (Level : Synthesis)
6. CO 6: Learners will be able to execute the queries and extract data from a database (Level : Evaluation)

PO CO Mapping Matrix - 2020-21

Semester	Subject	Course Code	PO1	PO2	PO3	PO4	PO5	PO6
Semester 1	Fundamentals of Remote Sensing	2011PGIFRS	*					
	Fundamentals of the Earth's System	2012PGIFES	*	*			*	
	Fundamentals of Mathematics	2013PGIFMA	*	*				*
	Fundamentals of Computers	2014PGIFCO	*		*		*	
	Tools and Techniques in Geoinformatics I	2015PGITTG			*	*		
	Tools and Techniques in Geoinformatics II	2016PGITTG	*		*			*

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	Course	Code						
Semester 2	Introduction to Geo informatics	2021PGIINGI	*	*				
	Spatial Analysis on Statistical Methods	2022PGISASM	*	*				*
	Digital Image Processing	2023PGIDIP	*			*		
	Programming with Python	2024PGIPPY	*				*	
	Tools and Techniques in Geo informatics – III	2025PGITTG	*	*	*	*		*
	Tools and Techniques in Geoinformatics – IV	2026PGITTG			*		*	*
Semester 3	Research Methodology	2131PGIRMY	*			*		*
	Advances in Remote Sensing and Advanced Techniques in Spatial Data Processing	2132PGIARST	*					*
	Advances in GIS	2133PGIGIS			*	*		
	Web Designing	2134PGWDS				*		*
	Project	2135PGIPRJ	*	*	*	*	*	*
Semester 4	Geoinformatics and Health Care	2141PGIGHC	*		*			*
	Database Management Systems	2142PGIDMS					*	*
	Dissertation	2143PGIDISN	*	*	*	*	*	*