

Programme Project Report (PPR)
ODL Regulation 2020
MSC Geoinformatics
Uttarakhand Open University

The content of the Programme Project Report is as: -

Name of Programme: M.Sc. Geoinformatics


(a) Programme Mission & objectives:

Uttarakhand state comprises of geographically constrained areas. A large number of learners cannot avail higher education due to the aforesaid geographical constraints. The learners can avail higher education through ODL (Open and Distance Learning) mode. The mission of the programme is to provide higher education to the learners in a way which is easily accessible. The mission of the programme is students will learn, through Geo-informatics education to promote global perspectives, international understanding and how to analyze data, explore issues, problem solve, and evaluate situations in a geographic and spatial context.

Our vision is to conduct innovative research, teaching and outreach on the patterns and processes of life with a focus on geographic and spatial context.

The objectives of the programme are:

- Understanding of course content.
- Capacity to integrate information from many sources.
- Maximize the efficiency of decision making and planning.
- Provide efficient means for data distribution and handling.
- Apply tools and techniques of Geo-informatics.
- Classify, interpret, and analyze data.
- Students will be exposed to cartographic information and will develop map reading & map making skills.
- Students will learn how to use Geographic Information system for cartography. GIS is an important tool for apply the geographical methodology.
- Present clear, concise, and logical arguments based on specific and relevant examples.
- Update data quickly.




(b) Relevance of the Programme with HEI's Mission and Goals: One of the missions of higher education particularly Open and Distance Learning Institutions is to provide greater opportunities of access to Higher Education with equity to all the eligible persons and in particular to the vulnerable sections. Another mission of the Higher education Institutions is to initiate policies and programmes for strengthening research and innovations, and encourage institutions - public or private to engage in stretching the frontiers of knowledge. Uttarakhand is remote geographical area state and large number of students cannot attend the college due to geographical problem. Thus, the master's degree programme is very useful for the students. Particularly in the field of Remote Sensing & GIS.

(c) Nature of Prospective Target group of Learners: Geo-informatics being a multidisciplinary subject has its usefulness and applicability in every sphere of life, society, culture and organization. Those learners who wish to opt career in Geo-informatics related Government organizations such as Urban planner/ Community Development, Cartographer, GIS specialist, Climatologist, Transport Management. Environmental Management, Writer, Scientist, Teaching faculty, Emergency Management, Demographer, foreign services, Librarian information scientist, National Park service Ranger, Disaster Management ect. And Non- Government organizations such as International Union for a Conservation of Natural Resource, Real Estate Appraisal will be the largest group of learners. Also, those learners who left their higher education due to some reasons and those who have gaining the knowledge of the subject will be the target group.

(d) Appropriateness of the Programme to be conducted in Open and Distance Learning and/ or online mode to acquire skill and competence:

The access to knowledge on the subject is not accessible easily to those aspirants who reside in far remote areas and those who belong to weaker and marginal sections of the society. Therefore, initiating such programme in Open and Distance Learning (ODL) mode will help aspirants particularly residing in far-flung areas and those who belong to weaker sections, to acquire skill and knowledge on the subject area.

This programme is planned to be offered in the distance mode and by making learning accessible through part time study outside the working hours.

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(e) Instructional Design:

i) Curriculum design: Before designing the programmes and courses in Geo-informatics, attempts were made to draw upon the literature produced by other academic and professional institution in India and abroad. Due attention has been paid in balancing the theoretical knowledge with laboratory study, field survey/ studies, and Project work. The programme curriculum is given below:

Programme Curriculum:

Name of the Programme: Master of Science Geoinformatics

Programme Code: MSCGIS-21

Programme Mode: Semester

Eligibility: Graduation with science or engineering stream

Duration Min: 2 Years; Max: 4 Years

Self-Learning Material (SLM): English

Programme Fee: Fee per semester: - 12500/

Total fee M.Sc. Programme = 50000 /

Total Credit: 64

Programme Structure:

M.Sc. 1st Semester

GIS-501/DGIS-501/CGIS-501

Course Name: Introduction to Informatics

Programme : Master of Science

UNIT SCHEDULE

UNIT 1: Fundamental of computers

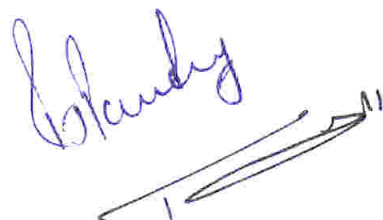
UNIT 2: Communication and connectivity

UNIT 3: Basics of networking

UNIT 4: Operating systems

UNIT 5: File system

UNIT 6: Software

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M.Sc. Ist Semester

GIS-503/DGIS-503/CGIS-503

Course Name: Fundamentals of GIS

Programme : Master of Science

Unit Schedule

Block 1: Introduction of GIS

Unit 1: Definition and History of GIS

Unit 2: Data Models

Unit 3: Data Query

Unit 4: Data output and Visualization

Block 2: Overview on RS & GIS Software

Unit 5: Introductory idea about RS software

Unit 6: Overview of open-source software

Unit 7: Overview of Quantum GIS software

Unit 8: Overview of GIS portals and open data archives

M.Sc. Ist Semester

GIS-504/DGIS-504/CGIS-504

Course Name: Cartography

Programme : Master of Science

Unit Schedule

Block 1: Map-A special Graphic Communicator

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Unit 1: History and Definition of Maps

Unit 2: Classification of maps

Unit 3: Scale and types of scale

Block 2: Map Projections

Unit 4: Meaning, Definition, Shape, Distance, Area and Direction properties

Unit 5: Classification of Projection

Unit 6: Selection of a Projection

Block 3: Map Compilation and Design

Unit 7: Base map concepts, scanning and digitization- Planimetric, Topographic and Thematic

Unit 8: Information- Sample and census surveys attribute data tables, elements of map, map layout principals

Unit 9: Map design fundamentals, symbols and conventional signs, graded and ungraded symbols, color theory, colors and patterns in symbolization, map lettering

Block 4: Map Making

Unit10: Definition of choropleth, daysimetric and isopleths maps

Unit11: Class interval selection and shading

Unit12: Isopleth maps and interpolation strategies, flow maps, cadastral maps

Unit13: Demographic and statistical mapping, sequential maps

Unit14: Map production, map printing, colors and visualization, map reproduction, printing soft copies and standards

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M.Sc Ist Semester

GIS-P1

GIS-P1 (PRACTICAL)

Programme : Master of Science

Unit schedule

BLOCK 1: Hardware, Software & Devices

Unit1: Excel

Unit2: Microsoft Word

Unit3: Power point

Unit4: Paint

Unit5: Exercise on installing device driver, printers, and other hardware devices

BLOCK 2: PRACTICAL EXERCISES OF GOOGLE/ BHUVAN

Unit6: Overview of ISRO's Earth observation visualisation bhuvan portal

Unit7: Visualisation of 2D/3D of Indian imaging capabilities and free data download

Unit8: Rich thematic services (land, ocean, weather, disaster) to select, browse and query and how to consume available OGC WMS services

Unit9: Collaboration tool for community participation

BLOCK 3: MAP READING EXERCISES

Unit10: Map information: types and purposes of maps, map elements, map symbols

Unit11: Scale introduction: units of measurement, map distance and ground distance, representative fraction scale, verbal scale, bar scale, scale conversions

Unit12: Coordinate systems: the graticule, parallels of latitude and meridians of longitude

M.Sc. IInd Semester

GIS-505/DGIS-505/CGIS-505

CourseName: Advance Remote Sensing

Programme : Master of Science



Unit Schedule

BLOCK 1: OVERVIEW OF SATELLITE IMAGES

- Unit 1 - Characteristics of images obtained from different sensors
- Unit 2- Geometric, Radiometric and Atmospheric Corrections
- Unit 3- Thermal Infra-Red images

BLOCK 2: HYPER SPECTRAL

- Unit 4: Introduction to Hyperspectral Remote Sensing
- Unit 5: Characteristics of Hyperspectral data, Spectral Image Library
- Unit 6: Hyperspectral Data Interpretation

BLOCK 3: MICROWAVE

- Unit 8: The RADAR principles, RADAR Wavebands, Side looking Airborne RADAR (SLAR) systems & Synthetic Aperture Radar (SAR), Real Aperture Radar (RAR)
- Unit 9: Interaction between Microwaves and Earth's surface
- Unit 10: Geometrical characteristics of microwave image
- Unit 11: Interpreting SAR images

BLOCK 4: DIGITAL IMAGE PROCESSING

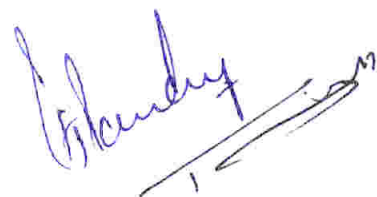
- Unit 12: Introduction to digital Image processing
- Unit 13: Preprocessing, Image registration & Image Enhancement Techniques
- Unit 14: Spatial Filtering Techniques & Image transformation
- Unit 15: Image classification

M.Sc. IInd Semester

GIS-506/DGIS-506/CGIS-506

Course name: Advance GIS

Programme : Master of Science



Unit schedule

BLOCK 1: SPATIAL DATABASE

Unit1: GIS database

Unit2: Characteristics of spatial & non spatial data

Unit3: Topology creation and data query

Unit4: Data Manipulation

BLOCK 2: SPATIAL DATABASE RASTER ANALYSIS

Unit5: Raster data manipulation and reclassification

Unit6: Raster data analysis-local, focal, zonal and global

Unit7: Raster data analysis- arithmetic operations and decision rule based

Unit8: Raster data formats

Block 3: Spatial database vector analysis

Unit9: Overlay analysis- union, intersection

Unit10: Proximity analysis- buffering

Unit11: Networking analysis: optimal path & neighborhood

Unit12: Map manipulation

Unit13: Vector data formats

M.Sc. IInd Semester

GIS-507/DGIS-507


Course name: Recent Trends in Geo-informatics Part-I

Programme : Master of Science

Unit schedule

BLOCK 1: CLOUD COMPUTING

Unit1: Cloud computing basics (saas, paas, laas) like arc GIS cloud



Unit 2 Create a geo explorer web map
Unit3: Cloud based databases and web editing

BLOCK 2: 3D GIS

Unit4:3D GIS technology
Unit5: Modeling in 3d GIS
Unit6: Future vision of 3d GIS

BLOCK 3: RS BASED GEODETICS SURVEYS

Unit 7-Concept of Geodesy
Unit 8 – Near field and far field geodetic surveys
Unit 9 - Optical theodolites and measurement of angles
Unit 10 - Direct and reverse geodetic problem, theodolite moves and horizontal picture

BLOCK 4: GPS BASED RS SURVEYS APPLICATION POTENTIAL OF GPS

Unit 11 – Fundamentals of global positioning system
Unit 12 - Components / segments of global positioning system
Unit 13 - Coordinate system

M.Sc. IInd Semester

GIS-508/DGIS-508

Course name: Applications of Geo-informatics Part-I

Programme : Master of Science

Unit Schedule

BLOCK1: APPLICATIONS OF GEOINFORMATICS IN GEOMORPHOLOGY

Unit 1: Conceptual framework-interfaces Geoinformatics with geosciences, basic geomorphic process, and features



Unit 2: Geomorphic applications: principles of recognition elements for terrain evaluation, mapping of terrain, and classification of landforms, interpretation of erosional and depositional landforms, and interpretation of drainage systems

Unit 3: Hydro Geo-morphological applications-hydrologic features and their elements, surface water and ground studies, interpretation techniques for targeting groundwater potential zones, delineation of watershed, watershed prioritization and management

BLOCK 2: GPS BASED RS SURVEYS ADVANCE APPLICATION POTENTIAL OF GPS

Unit 4 - Environment

Unit 5 - Agriculture

Unit 6 - Public safety & disaster relief

Unit 7- Surveying & mapping

Unit 8 - Roads and highways

Unit 9 -Navigation

M.Sc IInd Semester

GIS-P2

GIS-P2 (PRACTICAL)

Programme : Master of Science

BLOCK 1: GEO REFERENCING AND IMAGE RECTIFICATION

Unit1: Georeferencing using ground control points (GCPs)

Unit2: Image rectification using resampling techniques

BLOCK 2: IMAGE ENHANCEMENT

Unit3: Linear contrast, piecewise stretching, High pass, and low pass filter

Unit4: Image Rationing (Indices like NDVI ect.)

BLOCK 3: UNSUPERVISED AND SUPERVISED CLASSIFICATION

Unit5: Unsupervised classification (kmeans, ISODATA)

Unit6: Supervised classification (maximum likelihood, minimum distance, and box classification)

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M.Sc. IIIrd Semester

GIS-601

Course name: Recent Trends in Geo Informatics Part II

Programme : Master of Science

Unit schedule

BLOCK 1: LIDAR

Unit1: Principles and properties- different LIDAR system, space borne and airborne LIDAR missions, typical parameters of LIDAR system

Unit2: Data processing- geometric correction, data quality enhancement, filtering LIDAR, mapping applications

BLOCK 2: WEB GIS

Unit3: Web GIS technology

Unit4: Web GIS architectures

Unit5: Web GIS development

Unit6: Survey of software and hardware

Unit7: Web GIS applications & future of web GIS

BLOCK 3: CROWD SOURCING

Unit8: Overview of crowd sourcing

Unit9: Mobile apps for crowd sourcing

Unit10: Moderation of crowd sourced datasets

Unit11: Uploading and visualization of crowd sourcing datasets like bhuvan Portal

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M.Sc. IIIrd Semester

GIS-602

COURSE NAME: APPLICATIONS OF GEO-INFORMATICS PART III

Programme : Master of Science

BLOCK 1: APPLICATIONS OF GEO INFORMATICS IN FOREST

Unit 1: Introduction and distribution of forests types in India

Unit 2: Interaction of EMR with vegetation, spectral and temporal characteristics of vegetation,

Unit 3: Forest covers type and forest density mapping, forest cover change detection, forest management, Biomass and Bio-diversity studies

BLOCK 2: APPLICATIONS OF GEO INFORMATICS IN DISASTER RISK MANAGEMENT

Unit 4: Overview of disasters, meaning, definition and classification of disasters, importance of remote sensing & GIS in disaster management- reconnaissance, forecast, forewarning systems, disaster preparedness with respect to different disasters

Unit 5: Earthquake: Meaning, causes, prediction of earthquake, Geomatics in earthquake mitigation, seismic damage and loss estimation, quake rehabilitation and earthquake disaster management. Landslide: Meaning, causes, types and mitigation measures, landslide monitoring and landslide zonation; Floods: meaning, types and mitigation measures, flood potential zonation mapping, flood hazard and risk analysis using RS & GIS, flood disaster monitoring and reporting system.

Unit 6: Recent trends in disaster management, the role of mobile GIS and SDI as integrated frame work in emergency management.

BLOCK 3 APPLICATIONS OF GEO-INFORMATICS IN URBAN & INFRASTRUCTURE

Unit 7: Concept of urban and regional planning, Urban land use planning and classification systems, urban resources information and infrastructures.

Unit 8: Remote sensing data and scales for urban area analysis, urban sprawl mapping and monitoring using remote sensing, residential area analysis

Unit 9: Overview of urban infrastructure, facilities and services, slum and squatter settlement and their identification urban services and facilities analysis, land suitability analysis for urban area development.



M.Sc. IIIrd Semester

GIS-P3

GIS-P3 (PRACTICAL)

Programme : Master of Science

BLOCK 1: SPATIAL AND NON-SPATIAL QUERIES

Unit1: SQL based non spatial queries

Unit2: Spatial queries based on location and topology relationships

BLOCK 2: RASTER AND VECTOR ANALYSIS

Unit3: Raster manipulations (local, focal, zonal, and global)

Unit4: Vector analysis (overlay, buffering, networking)

BLOCK 3: SPATIAL DATABASE CREATIONS

Unit5: Geo database creation (Point, line, polygon)

Unit6: Attribute data creation

BLOCK 4: PRACTICAL EXERCISES OF GPS

Unit7: Handling of handheld GPS

Unit8: Point and line measurement using GPS

Unit9: RMS error estimation

Unit10: Mobile routing using GPS



M.Sc. IVth Semester

GIS-604

COURSE NAME: FORMULATION OF PROJECT & RESEARCH METHODOLOGY

Programme : Master of Science

Unit Schedule:

Spatial conceptualization and implementation
Defining the research problem
Research design
Research design and spatial enquiry
Methods of data collection and management
Processing and analysis of data
Interpretation and report writing
Future directions for geospatial use
Writing research report

M.A IVth Semester

MP-01

MP-01 (MAJOR PROJECT)

f) Procedure for admission, curriculum transaction and evaluation:

Admission: Twice in year

Eligibility: Bachelor of Science/ BTech.

Fee Structure: Rs. 12500/- per semester

Evaluation norms: A learner will be evaluated through continuous evaluation

(Assignments) and term end evaluation (Term end examination) at the end of semester.




Continuous evaluation will carry 30% weightage whereas term end evaluation will carry 70% weightage.

g) Requirement of the laboratory support and Library Resources: In order to carry out laboratory exercises, laboratory is compulsory requirement of the programme and in order to meet this requirement, the laboratory facilities of study centres will be utilized. She/he will be provided laboratory manual as per the need of the programme. Similarly for library, a learner may utilize the resources available at the designated study centre.

i) Cost estimate of the programme and the provisions:

Writing of 160 units in English: Rs. 6000x 160 = Rs. 960,000

Editing of 160 units: 3000x160= 480,000

Typing of 3,520 pages (per unit approx. 22 pages): 3,520x 20= Rs. 70,400

Postal charges (Approx.) Rs. 5000

Total amount: 1,515,400

i) Quality assurance mechanism and expected programme outcomes:

The programme will help in the development of professionally skilled, in general, and in corporate sector, in particular.

The programme will be implemented through only those Government degree colleges/ universities/ Institution which have facilities for conducting laboratory counseling in addition to this University will organize Laboratory workshop in designated places once (year/semester) for additional back up to the students so that competent and skilled human resource in produced. Further, the programme and SLM developed will be continuously upgraded and necessarily be revised after a period of 5 years.

Programme outcomes:

Bridge the flow of information between civil society, professional, corporate, policy and decision-makers.

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