

Programme Project Report (PPR)

M.Sc – GEO-INFORMATICS

(School of Earth and Environmental Sciences)

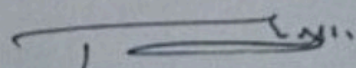
(Postgraduate)

Programme Mission & objectives: Programme's mission & objectives: 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.

The objectives of the programme can:

- 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.

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. 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.



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.

Appropriateness of the Programme to be conducted in ODL mode to acquire still competence: This programme is planned to be offered in the distance mode and by making learning accessible through part time study outside the working hours.

Geo-informatics is a discipline that provides students not only with ample career opportunities and it provides students with knowledge about our rapidly-changing world and how humans the capabilities of in-service workers as well as new aspirant so that they have necessary knowledge.

Instructional Design:

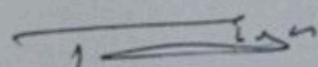
Curriculum design: Before designing the programmes and courses in Geo-informatics, attempts were made to draw upon the literature produced by other academic and professional institution in India and abroad. Due attention has been paid in balancing the theoretical knowledge with laboratory study, field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

M.Sc. Ist 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

UNIT 7: Basic computing using windows

UNIT 8: Introduction to MS word

UNIT 9: Introduction to MS excel 2007

UNIT 10: Database management systems

M.Sc. Ist Semester

GIS-502/DGIS-502/CGIS-502

Course Name: Fundamentals of Photogrammetry & Remote Sensing

Programme : Master of Science

Unit Schedule

Block 1: Introduction to Remote Sensing

Unit 1: Definition, scope and evolution of Remote Sensing

Unit 2: Electromagnetic Radiation (EMR) and atmospheric Windows

Unit 3: Platforms and Sensors

Block 2: Aerial Photography

Unit 4: Aerial Photograph



Unit 5: Stereoscopic area Photograph

Unit 6: Relief Displacement in Aerial Photograph

Block 3: Introduction to Image Interpretation

Unit 7: Concept of Photography

Unit 8: Sensor Resolutions

Unit 9: Elements of Image Interpretation

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

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, day-simetric and isopleth 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

M.Sc Ist Semester

GIS-P1

GIS-P1 (PRACTICAL)

Programme : Master of Science

M.Sc. IInd Semester

GIS-505/DGIS-505/CGIS-505

CourseName: Advance Remote Sensing

Programme : Master of Science

Unit Schedule

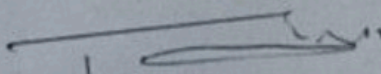
BLOCK 1: OVERVIEW OF SATELLITE IMAGES

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

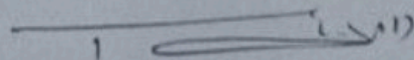
Programme : Master of Science

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

1. 12/11

Unit1: Cloud computing basics (saas, paas, iaas) like are 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

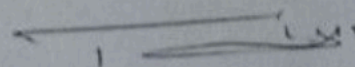
Unit 11 – Fundamentals of global positioning system
Unit 12 - Components / segments of global positioning system
Unit 13 - Coordinate system

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



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

M.Sc. IIIrd Semester

GIS-602

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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.

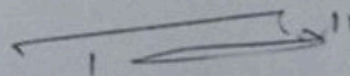
Unit 6: Recent trends in disaster management, the role of mobile GIS and SDI as integrated frame work in emergency management.

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

M.Sc. IVth Semester

GIS-604

COURSE NAME: FORMULATION OF PROJECT & RESEARCH
METHODOLOGY

Programme : Master of Science

M.A IVth Semester

MP-01

MP-01 (MAJOR PROJECT)

Programme : Master of Science



Duration of the programme: Minimum duration of programme is two (02) years (4 Semesters) and maximum duration is six (06) years

Faculty and support staff requirement: One Professor and two Assistant Professor (AC) are available in Department of Geography, School of Earth and Environmental Science. However, two more Permanent Faculty will be required for more efficient conduction of the programme.

Instructional delivery mechanism: The programme will be offered in the Open and Distance learning (ODL) mode Guided self-study using print (SLM) and electronic media, lecture/ counseling sessions; special counseling sessions and group instructions in workshop at cluster level; self-reliant study activities; individual/ group work assignment; Project work; lab sessions and exclusion. The delivery material will include printed SLM, assignment, face to face counseling at the designed study centres during Saturday and Sunday. Laboratory workshop will be conducted for 10 days at designated Study Centres

Procedure for admission, curriculum transaction and evaluation:

Admission: Twice in year

Eligibility: Bachelor of Science/ BTechor Bachelor of Arts/Bachelor of Commerce .

Fee Structure: Rs. 12650/- per semester

Curriculum transaction

Contact classes and practical shell take place in weekends or holidays at learning centres.

Tutorial classes shall take place as per the number of sessions and hours for each course.

Printed materials: 1- Printed course modules. 2- Printed assignments/ Online assignments, 3- Students programme guide including model question papers.

Other materials: Audio and Video programmes. These video programmes in DVD format shall be provided to the students along with printed materials.

Evaluation

Self assessment: Self assessment shall take place in each unit with the help of self assessment questions and activities. These assessments shall not carry any weight in terms of exam grading.

Assignments shall comprise 30% weight in the scheme of assessment.

The Term-End Exam which shall take place in designated exam centres comprises 70% weight.



Those students who cannot complete the entire programme(assignments, projects, TEE) shall be given another chance to continue with the next admission cycle and complete the Degree programme to maximum six year.

Requirement of the laboratory support and Library Resource:

In order to carry out laboratory exercise, laboratory is compulsory requirement of the programme and in order to meet this requirement, the laboratory facilities of learning 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. Selected learning centers well equipped laboratory, Teaching staff, Classrooms & other necessary facilities. Well established library facilities for learners in Headquarter also.

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

Quality assurance mechanism and expected programme outcomes:

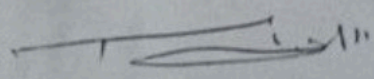
The programme will help in the development of professionally skilled, in general, and in corporate sector, in particular.

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.

An ability to apply knowledge of mathematics, science/ Arts, and applied sciences/Arts. An ability to design and conduct experiments, as well as to analyze and interpret data.





DEPARTMENT OF REMOTE SENSING & GIS, UTTARAKHAND OPEN UNIVERSITY

Proceedings of Board of Studies

A Board of Studies (BOS) meeting was held on dated 26/06/2021(Online Mode) in order to revise/restructure course curriculum/syllabus for Masters, Diploma and Certificate programme/s in Geoinformatics. The meeting started with welcome address by the Director, School of Earth and Environmental Sciences and brief introduction of the programme was laid down by Programme Co-ordinator. Following members were present in the meeting:

- 1- Dr. P.D. Pant, Professor & Director, School of Earth and Environment Science, Uttarakhand Open University, Haldwani - **Chairperson**
- 2- Dr. R. K. Pande, Professor & Dean of Arts, Department of Geography, DSB Campus, Kumaun University, Nainital - **Member**
- 3- Dr. D.D. Chauniyal, Retd. Professor, Department of Geography, Garhwal University, Srinagar, Uttarakhand - **Member**
- 4- Dr. Pradeep Goswami(Professor), Department of Geology, DSB Campus, Kumaun University, Nainital - **Member**
- 5- Dr. Suneet Naithani(Professor), Department of Environment Science, Doon University, Dehradun – **Special Invitee**
- 6- Dr. Ranju Joshi Pandey, Assistant Professor and Programme Co-ordinator, Department of Remote Sensing & GIS, Uttarakhand Open University, Haldwani - **Member**


The following decisions were taken unanimously with regard to implementation of Geoinformatics programme:


1. The syllabus of M.Sc. Geoinformatics & M.A. Geoinformatics has been restructured and approved by members, which will run in Semester mode as per UGC guidelines.
2. Nomenclature of PG diploma in Geoinformatics has been changed and now it will be Diploma in Geoinformatics. The syllabus of Diploma in Geoinformatics is also restructured and approved by the members.
3. The syllabus of Certificate Course in Geoinformatics is restructured and approved by the members.
4. Expert list of Geoinformatics was finalized and approved by the members.
5. Admission eligibility for M.Sc. Geoinformatics programme will be Graduation with science stream and for M.A. Geoinformatics programme will be Graduation with arts/commerce stream. Lateral entry in 3rd semester will be allowed to those candidates who have completed PGDGIS from a UGC recognized University.
6. If any modification is urgently required regarding the Programme/Course/Contents etc., then the programme coordinator, with the endorsement of the higher authority (Director/ Director Academics) can make some minor changes (not more than 10% of the total syllabus). The modifications should be compulsorily placed in the next BOS meeting for approval.


The meeting ended with vote of thanks to the Chair and all members.


Professor Sumant Nathani
(Special Invited)

Professor D.D. Chaudhary
(Member)


Dr. Ranga J. Pandey
(Member)


Professor Pradyot Choudhary
(Member)


Professor R.K. Pandey
(Member)


Professor P. D. Patil
(Chairperson)