AC:

Item No.

Rayat Shikshan Sanstha's

KARMAVEER BHAURAO PATIL COLLEGE, VASHI,
AUTONOMOUS COLLEGE

Sector-15- A, Vashi, Navi Mumbai -400 703
NAAC Grade "A+" with CGPA 3.53

Choice Based Credit System Syllabus

Program: M.Sc. Geoinformatics

M.Sc.-I
Semester: I and II

(As per Choice Based Credit System (CBCS)
with effect from the academic year 2022-23)

Karmaveer Bhaurao Patil College Vashi, Navi Mumbai

Autonomous College

[University of Mumbai]

Syllabus for Approval

Sr. No.	Heading	Particulars
1	**Title of Course**	M.Sc.Geoinformatics Part-I. Sem.-II
2	**Eligibility for Admission**	•Students having Bachelor's / Master's degree in Physics, Chemistry, Botany, Zoology, Statistics, BCA, Mathematics, Geology, Geophysics, Earth and Natural Sciences, Geography, Atmospheric Science, Agriculture, Electronic Science, RS&GIS and other related sciences can apply to this course. •Students having Bachelor's degree (B.E / B.Tech) in Engineering / Bachelor's degree in Planning or in other engineering branches and equivalent can also apply to this two years MSc. course in Geoinformatics.
3	**Passing Marks**	40%
4	**Ordinances/Regulations (if any)**	
5	**No. of Years/Semesters**	One year/Two semester
6	**Level**	P.G.
7	**Pattern**	Semester
8	**Status**	New (CBCS)
9	**To be implemented from Academic year**	2022-23

Preamble of the Syllabus:

Geoinformatics is a newly emerging discipline which is having wide application in various Government and non-government organisations. It has an ability to solve the real world problems. The field of Geoinformatics consists of Remote Sensing, Geographical information system and Global Navigation Satellite System with information technology.

It has a wide application in various fields including military and defense, Town Planning. Transport Management, Environmental Modeling, Disaster Management and Rescue Operation, Resource Mapping, Natural Resource Monitoring, Urban Planning and Management, Marketing, Business Management and so on.

Students undergoing the training for this course from various disciplines such as Geography, Geology, Zoology, Botany, Microbiology, Computer Science, Environment Science, Engineering, Agriculture, etc. would be able to develop an interdisciplinary approach in solving the problems using the Geospatial Technologies.

The students acquiring this degree and expertise in the field would be having vast opportunities in the field of Academics, Government Sectors, Private Industries and Non Profit Sector too.

The master science program is design to provide theoretical background as well as hands on training to the students to develop their career proficiency.

Specific Objectives of Learning:

To introduce Geoinformatics as an advance tool consists of various advance science and technologies used for mapping and managing earth resources.

1. To introduce the science and technologies involved in Geoinformatics.

2. To explain the earth and mapping principles.

3. To impart knowledge on traditional, conventional and advance surveying technologies.

4. To learn basics about the Geodata & Web-GIS.

5. To apply Geoinformatics in various fields

	Rayat Shikshan Sanstha's	
	KARMAVEER BHAURAO PATIL COLLEGE, VASHI, NAVI MUMBAI	
	(Autonomous)	
	Department of Geography	
	Program Outcomes (POs)	
Learners are able to:		
PO-1	**Disciplinary Knowledge**	Built conceptual foundation and application skills in the area of Physical Geography, Geomorphology, Growth and Development models, Agricultural Geography, Political Geography, Economic Geography, Industrial Geography seeking youth fit for employment as well as making appropriate/ rational decisions in their day to day personal and public life.
PO-2	**Research Skill**	Identify various economic problems, select and execute appropriate research method and methodology, conduct research rationally, writing (appropriate) meaningful report as well as dissertation and communicate it to the stakeholders.
PO-3	**Think Critically**	Develop critical thinking skill towards current Socio- economic issues, various policies, procedure for policy implementation and its lags, loopholes and find probable solutions to deal impediments/hurdles in life with courage and positive perspective.
PO-4	**Collaboration and Co-operation**	Speaking, reading, writing, listening, guiding etc. clearly in person and make meaning of the world by connecting people, ideas, books, media and technology.
PO-5	**Social Interaction and social justice**	Elicit views of others, mediate disagreements and help to reach the conclusions in group and contribute for social justice and inclusive growth.
PO-6	**Responsible and rational Citizens**	Strengthen human values, sense of social service, egalitarian, righteous conduct for self, family society and makes responsible and dutiful citizen.
PO-7	**Efficiency, Environment and Sustainability**	Understand the issues in context with environment, growth along with its procedure, needs and efforts taken at national and international level through MDGs and SDGs. for sustainable development. Analyse efficiency and future prospects with special reference to India.
PO-8	**Entrepreneurship and Ethics**	Strengthen entrepreneurial skills and ability to prepare a business plan and its execution. Also recognize different value systems based on own realization, understandings the moral dimensions of decisions, and accept responsibility for them.
PO-9	**Leadership and Teamwork**	Work cooperatively and lead proactively to achieve the goals of the organization by implementing the plans and projects in various field-based situations related to science, technology and society at large.
PO-10	**Self-directed-Life-long Learning and**	Acquire the ability to engage in independent and life-long learning in the broadest context of socio-economic and technological changes. Identify relevant topic and go for highest research degrees like Ph. D. as well as occupy

	Progression	significant position and make it more meaningful.
PROGRAMME SPECIFIC OUTCOMES (PSOs)		
POS1	**Geographical Knowledge**	Demonstrate advanced understanding of key theories, concepts, and methodologies in human and physical geography. Apply geographical knowledge to analyze and interpret complex spatial patterns and relationships.
PSO2	**Research Skills**	Conduct independent and original research in geography using appropriate research methods. Evaluate and synthesize existing literature to contribute to the advancement of geographical knowledge.
PSO3	**Spatial Analysis and GIS Skills**	Proficiently use Geographic Information Systems (GIS) and other spatial analysis tools to analyze and interpret spatial data. Apply spatial analysis techniques to address real-world geographical challenges.

Course No.	Course Title	Course Type	Course Code	CIE Marks	SEE Marks	Total	Credit Points
Semester I							
1.1	Introduction to fundamentals of Geography	Core Course	PGGINF101	40	60	100	6
1.2	Fundamentals of Remote Sensing	Core Course	PGGINF102	40	60	100	6
1.3	Fundamentals of Geographic Information System	Core Course	PGGINF103	40	60	100	6
1.4	Practical in Remote Sensing	DSE	PGGINF104A	40	60	100	6
	Fundamentals of Computers	DSE	PGGINF104B	40	60	100	6
1.5	Practical in Geographic Information System	SEC	PGGINF105	40	60	100	4
Total						**500**	**28**
Semester II							
2.1	Aerial Photography and Photogrammetry	Core Course	PGGINF201	40	60	100	6
2.2	Cartography and Data representation	Core Course	PGGINF202	40	60	100	6
2.3	Introduction to Statistics	Core Course	PGGINF203	40	60	100	6
2.4	Database Management Systems: Concepts and Methods	DSE	PGGINF204A	40	60	100	6
	Open source GIS	DSE	PGGINF204B	40	60	100	6
2.5	Introduction to Programming Language	SEC	PGGINF205	40	60	100	4
Total						**500**	**28**

M. Sc. GEOINFORMATICS at Semester I & II
with effect from the Academic Year 2022-23

INTRODUCTION TO FUNDAMENTALS OF GEOGRAPHY
(Core Course)

Course Outcome:
On successfully completion of this course, the students will able to -
> CO1: Understand various disciplines in Geography.
> CO2: Understand the process of landscape development.
> CO3: Understand the process involved in climatic variation.
> CO4: Understand the man-environment inter-relationship.
> CO5: Understand the population demographics and urbanization

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	2	1	-	1	-	-	3	1	2	-	3	2	2	3
CO2	2	2	-	-	-	-	-	-	-	-	-	-	-	-	-
CO3	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO5	3	-	-	-	2	-	-	-	-	-	-	-	-	-	-
WT. AVG	2.00	2.00	1.00		1.50			3.00	1.00	2.00		3.00	2.00	2.00	3.00
									Overall Mapping of Subject						2.05

*In CO-PO Mapping Matrix: a correlation is established between COs and POs in the scale of 1 to 3, 1 being the slight (low), 2 being moderate (medium), 3 being substantial (high), and '-' indicate there is no correlation in respective CO and PO.

Modules at a Glance
Introduction to fundamentals of Geography
(PGGINF101)

Unit No.	Unit	Unit Wise Weightage of Marks (in %)
1	Introduction to Geography	15
2	Introduction to Geomorphology	15
3	Introduction to Climatology	15
4	Introduction to Human Geography	15

	M. Sc. GEOINFORMATICS-I **CORE COURSE** **Introduction to fundamentals of Geography** SEMESTER:I COURSE CODE:PGGINF101, CREDITS:6 Teaching Hours 60 + Notional Hours 60 = Total hours 120	
Units	**Name of the Sub Topic**	**No of Lectures**
	Unit- I Introduction to Geography	
1.1	Introduction: Geography as a Discipline. Branches in Geography	
1.2	Man- Nature Relationship, Approaches: Systematic, Regional, Environmentalism and Possibilism	15
1.3	Concepts: Place (physical and cultural attributes), Space, Environment interconnection.	
1.4	Concept and meaning of Sustainability, Location (Relative / Absolute), Region, Spatial Interaction.	
	Unit – II Introduction to Geomorphology	
2.1	Nature, scope and content of Geomorphology	
2.2	Development of geomorphic thought, concept of Catastrophism, Uniformitarianism, Neocatastrophism	15
2.3	Geomorphic features formed by the process of Erosion, Deposition and Transportation work of various agents.	
	Unit – III Introduction to Climatology	
3.1	Nature and scope of Climatology, Weather elements and climatic controls	
3.2	Insolation and Distribution of Temperature, Pressure and Winds on globe	15
3.3	General Global Circulation Pattern and Cyclones	
	Unit-IV Introduction to Human Geography	
4.1	Definition, Concepts, Nature and Scope of Human Geography (Economic, Population and Settlement).	
4.2	Factors influencing population distribution and density, Population distribution patterns- world and India	15
4.3	Urban Land use – various approaches, land economics, activity systems Urban location of economic activities	

References

1. Barry, R.S. & Chorley, R.J. (1971): Atmosphere, Weather and Climate, ELBS, Methuen & Co. Ltd., U.S.A.

2. Griffiths, J.F.(1966): Applied Climatology-An Introduction, Oxford University Press, London.

3. Lal, D.S.(1997):Climatology, Sharda PustakAnhert, F., (1996), „Introduction to Geomorphology", Arnold, London, Sydney, Aukland.

4. Bloom, A. L. (2002), „Geomorphology: A Systematic Analysis of Late Cenozoic Landforms", Pearson Education Pvt. Ltd., and Singapore.

5. Christopherson, R.W. (1994), „Geosystems : An Introduction to Physical Geography", Macmillan College publishing Company, New York.

6. Hartshorne, T. A. and Alexander, J. W. (2010): Economic Geography, PHI Learning, New Delhi

7. Knox, P., Agnew, J. and McCarthy, L. (2008): The Geography of the World Economy, Hodder Arnold, London

8. Bhende, A. and Kanitkar, T. (2008): Principles of Population Studies, Himalaya Publishing House, Mumbai

9. Shivramkrishanan, K. C. et al (2005): Handbook of Urbanization in India, Oxford, Delhi

10. Chandana, R. C. and Sidhu, M. S. (1980): Introduction to Population Geography, Kalyani, New Delhi

11. Hussain, M. (1999): Human Geography, Rawat Publication, Jaipur

FUNDAMENTALS OF REMOTE SENSING
(Core Course)

Course Outcome:
On successfully completion of this course, the students will able to -
        CO1: Understand the process of Remote Sensing.
        CO2: Understand the characteristics of EMR.
        CO3: Know the characteristics of Sensors and Platforms.
        CO4: Understand the elements of interpretation of various satellite products.
        CO5: Differentiate the various features from satellite image.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	2	1	-	1	-	-	3	2	2	-	3	2	2	3
CO2	2	2	-	-	-	-	-	-	-	-	-	-	-	-	-
CO3	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO5	3	-	-	-	2	-	-	-	-	-	-	-	-	-	-
WT. AVG	2.00	2.00	1.00		1.50			3.00	2.00	2.00		3.00	2.00	2.00	3.00
										Overall Mapping of Subject					2.14

*In CO-PO Mapping Matrix: a correlation is established between COs and POs in the scale of 1 to 3, 1 being the slight (low), 2 being moderate (medium), 3 being substantial (high), and '-' indicate there is no correlation in respective CO and PO.

Modules at a Glance
Fundamentals of Remote Sensing
(PGGINF102)

Unit No.	Unit	Unit Wise Weightage of Marks (in %)
1	Introduction to Remote Sensing	15
2	Sensors, Scanners and Platforms	15
3	Satellite Image Interpretation	15
4	Application of Remote sensing	15

	M. Sc. GEOINFORMATICS-I CORE COURSE **Fundamentals of Remote Sensing** SEMESTER: I COURSE CODE: PGGINF102 CREDITS: 6 Teaching Hours 60 + Notional Hours 60 = Total hours 120	
Units	**Name of the Sub Topic**	**No of Lectures**
	Unit- I Introduction to Remote Sensing	
1.1	Concepts Definition, History Development, process of Remote Sensing	15
1.2	Electromagnetic Radiation, EMR Spectrum, Theories of EMR, Types of RS and Laws of Radiation,	
1.3	Interaction of EMR: Interaction with Earth's Atmosphere, Atmospheric Window	
1.4	Spectral Signature: Interaction with Soil, Water and Vegetation	
	Unit – II Sensors, Scanners and Platforms	
2.1	Types and characteristics of platforms & satellite orbits.	15
2.2	Sensor classification: Active and Passive, Optical-Mechanical Scanners & Push-broom scanners, whisk broom scanners	
2.3	Types of Resolutions: Spatial, Spectral, Radiometric and Temporal	
2.4	Data Products: Satellite Data Generation, FCC & TCC images	
	Unit – III Elements of Image Interpretation	
3.1	Visual Analysis, Elements of image interpretation, Ground Truth Verification:	15
3.2	Digital images: Types Satellite data acquisition and image file formats, File values and Look up table	
3.3	Introduction to Indian Satellite Missions: Earth Resource Satellites,IRS Resourcesat and Cartosat, Meteorological Satellites, INSAT,	
3.4	Introduction to International Satellite Missions: Earth Resource Satellites Oceansat, LANDSAT, Ikonos Satellites Series, Geoeye, Quickbird, RADAR, LIDAR, MODIS, NOAA and other platforms	
	Unit-IV Application of Remote sensing	
4.1	Remote Sensing Applications: Land use Land cover, Agriculture, Forestry, Water resources	15
4.2	Regional and Urban Planning, Geology, Disaster Management, Atmospheric Science and Oceanographic studies, Soil and Hydrology	
4.3	Limitations faced in the application of remote sensing	

References

1. Anji Reddy, M. (2008): Textbook of Remote Sensing and Geographic Information System, B.S. Publication, Hyderabad

2. Drury, S. A. (2001): Image Interpretation in Geology, Blackwell, Oxford

3. Campbell, J. (2002): Introduction to Remote Sensing, Taylor & Francis, London

4. Jensen, J. R. (2005): Introductory Digital Image Processing, Prentice Hall, New Jersey

5. Jensen, J.R., (2006) "Remote Sensing of the Environment – An Earth Resources Perspective", Pearson Education, Inc. (Singapore) Pte. Ltd., Indian edition, Delhi.

6. Joseph, G. (2004): Fundamentals of Remote Sensing, Universities Press, Hyderabad, India

7. Lillesand, T. M., Kiefer, R. W. and Chipman, J. W. (2008): Remote Sensing and Image Interpretation, John Wiley & Sons, New Delhi

8. Sabins, F.F. Jr., (2007) Edition. 'Remote Sensing – Principles and Interpretation", W.H. Freeman &Co.

9. Reeves, Robert G. (1991), "Manual of Remote Sensing, Vol. I, American Society of Photogrammetry and Remote Sensing, Falls Church, Virginia, USA

FUNDAMENTALS OF GEOGRAPHIC INFORMATION SYSTEM
(Core Course)

Course Outcome:
On successfully completion of this course, the students will able to -
CO1: Comprehend knowledge about the concepts in GIS.
CO2: Articulate the various types of GIS data.
CO3: Understand the structure of GIS database
CO4: Perform spatial analysis

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	2	1	-	1	-	-	3	-	2	-	3	2	2	3
CO2	2	2	-	-	-	-	-	-	-	-	-	-	-	-	-
CO3	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO4	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
WT. AVG	2.00	2.00	1.00		1.00			3.00		2.00		3.00	2.00	2.00	3.00
												Overall Mapping of Subject			2.10

*In CO-PO Mapping Matrix: a correlation is established between COs and POs in the scale of 1 to 3, 1 being the slight (low), 2 being moderate (medium), 3 being substantial (high), and '-' indicate there is no correlation in respective CO and PO.

Modules at a Glance
Fundamentals of Geographic Information System
(PGGINF103)

Unit No.	Unit	Unit Wise Weightage of Marks (in %)
1	Introduction to GIS	15
2	Data Types & Models	15
3	Introduction to GIS database	15
4	Spatial Analysis	15

	M. Sc. GEOINFORMATICS – I **CORE COURSE** **Fundamentals of Geographic Information System** SEMESTER:I COURSE CODE:PGGINF103, CREDITS:6 Teaching Hours 60 + Notional Hours 60 = Total hours 120	
Units	**Name of the Sub Topic**	**No of Lectures**
	Unit- I Introduction to GIS	
1.1	Meaning, Nature, scope and content of GIS	15
1.2	Basic concepts: Definition, History and development	
1.3	Components of GIS, Hardware & Software requirements	
1.4	Applications of GIS	
	Unit – II Data Types & Models	
2.1	Spatial Data – Concept and Sources	15
2.2	Data Models – Raster & Vector	
2.3	Non-spatial Data – Concept, Sources	
2.4	Data Models – Relational, Network, Hierarchical & Object-orientated	
	Unit – III Introduction to GIS database	
3.1	Representation of geographic features in vector, raster data models.	15
3.2	Concept of arc, node, vertices and topology.	
3.3	Computer representation for storing spatial data: Block code, Run-length encoding, Chain coding, Quad tree.	
3.4	Issues governing choice of models	
	Unit-IV Spatial Analysis	
4.1	Spatial Data Input: Digitization, Error Identification. Errors: Types, Sources, Correction. Editing and Topology Building	15
4.2	Vector based operations: overlay analysis	
4.3	Raster Based: Map Algebra, Grid Based Operations,	
4.4	Local, Focal, Zonal and Global Functions, Cost Surface Analysis, Optimal Path and Proximity Search	

References

1. Burrough, P. A. and McDonnell, R. A. (2000): Principles of Geographical Information Systems, Oxford University Press, New York

2. Chang, K. T. (2008): Introduction to Geographic Information Systems, Avenue of the Americas, McGraw Hill, New York Longley.

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6. Lo, C. P., Yeung, A. W. (2002): Concepts Techniques of Geographical Information Systems, Prentice-Hallof India, New Delhi

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PRACTICAL IN REMOTE SENSING
Discipline Specific Elective (DSE)

Course Outcome:

On successfully completion of this course, the students will able to -

        CO1: Use the Image Processing Softwares .

        CO2: Identify and interpret the various satellite data products.

        CO3: Perform the digital processing of the satellite data

        CO4: Differentiate between various Natural and Man-made features

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	2	1	-	1	-	-	3	-	2	-	3	2	2	3
CO2	2	2	-	-	-	-	-	-	-	-	-	-	-	-	-
CO3	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
WT. AVG	1.67	2.00	1.00		1.00			3.00		2.00		3.00	2.00	2.00	3.00
											Overall Mapping of Subject				2.07

*In CO-PO Mapping Matrix: a correlation is established between COs and POs in the scale of 1 to 3, 1 being the slight (low), 2 being moderate (medium), 3 being substantial (high), and '-' indicate there is no correlation in respective CO and PO.

Modules at a Glance
Practical in Remote Sensing
(PGGINF104A)

Unit No.	Unit	Unit Wise Weightage of Marks (in %)
1	Overview of the software	15
2	Introduction to Satellite Image	15
3	Introduction to Digital Image Processing	15
4	Satellite Image Interpretation	15

	M. Sc. GEOINFORMATICS –I **Discipline Specific Elective (DSC)** **Practical in Remote Sensing** SEMESTER:I COURSE CODE:PGGINF104A CREDITS:6 Teaching Hours 60 + Notional Hours 60 = Total hours 120	
Units	**Name of the Sub Topic**	**No of Lectures**
	Unit- I Overview of the software	
1.1	Introduction to various data products, selection of datasets	
1.2	Downloading and accessing global database	15
1.3	Introduction to Software: QGIS and ENVI	
1.4	Opening of satellite data and band combinations	
	Unit – II Introduction to Satellite Image	
2.1	Familiarization with Image Processing System: Loading of Image Data	
2.2	Identification of Objects on Visual Display, Study of Histograms and Layer Information	15
2.3	Digital images: Types Satellite data acquisition and image file formats, File values and Look up table	
2.4	Visual identification of features	
	Unit – III Introduction to Digital Image Processing:	
3.1	Types Sources of Errors: Atmospheric, Radiometric and Geometric.	
3.2	Image Rectification: Geometric Correction, Radiometric Correction, Noise Removal	15
3.3	Image Enhancement Techniques: Linear and Non- Linear Contrast Enhancement, Band Rationing, Edge Enhancement, High and Low Pass Filtering, Density Slicing	
3.4	Preprocessing: Atmospheric correction, Radiometric correction, Geometric correction	
	Unit-IV Satellite Image Interpretation	
4.1	Visual Analysis of satellite data, Identification of various natural and man-made features (Land use Land cover, Agriculture, Forestry)	
4.2	Digital Image Classification: Classification Scheme: Supervised Classification: Training Sites . Unsupervised Classification.	15
4.3	Classifier:Maximum Likelihood, Euclidian Distance, Mahalanobis Distance, Parallelepiped.	
4.4	Classification Accuracy Assessment and Error Matrix GCP and ground validation of data/image	

References

1. Anji Reddy, M. (2008): Textbook of Remote Sensing and Geographic Information System, B.S. Publication, Hyderabad

2. Drury, S. A. (2001): Image Interpretation in Geology, Blackwell, Oxford

3. Campbell, J. (2002): Introduction to Remote Sensing, Taylor & Francis, London

4. Jensen, J. R. (2005): Introductory Digital Image Processing, Prentice Hall, New Jersey

5. Jensen, J.R., (2006) "Remote Sensing of the Environment – An Earth Resources Perspective", Pearson Education, Inc. (Singapore) Pte. Ltd., Indian edition, Delhi.

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8. Sabins, F.F. Jr., (2007) Edition. 'Remote Sensing – Principles and Interpretation", W.H. Freeman & Co

FUNDAMENTALS OF COMPUTERS
Discipline Specific Elective (DSE)

Course Outcome:
On successfully completion of this course, the students will able to -
    CO1: Updated with the basic concepts of Computers.
    CO2: Understand the Structure & types of Computer.
    CO3: Get acquainted with the hardware and software component of the computers

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	2	1	-	1	-	-	3	-	2	-	3	2	2	3
CO2	2	2	-	-	-	-	-	-	-	-	-	-	-	-	-
CO3	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
WT. AVG	1.67	2.00	1.00		1.00			3.00		2.00		3.00	2.00	2.00	3.00
											Overall Mapping of Subject				2.07

*In CO-PO Mapping Matrix: a correlation is established between COs and POs in the scale of 1 to 3, 1 being the slight (low), 2 being moderate (medium), 3 being substantial (high), and '-' indicate there is no correlation in respective CO and PO.

Modules at a Glance
Fundamentals of Computers
(PGGINF104B)

Unit No.	Unit	Unit Wise Weightage of Marks (in %)
1	Basics of Computer	12
2	Structure & Types of Computer	12
3	Memory	12
4	Hardware	12
5	Software	12

Units	Name of the sub Topic	No of Lectures
M. Sc. GEOINFORMATICS –I **Discipline Specific Elective (DSC)** **Fundamentals of Computers** SEMESTER:I COURSE CODE:PGGINF104B CREDITS:6 Teaching Hours 60 + Notional Hours 60 = Total hours 120		
	Unit-I Basics of Computer	
1.1	Computer: Definition, Characteristics, Advantages and Disadvantages	12
1.2	Generations of Computer	
1.3	Concept of Data, Information and Knowledge	
	Unit 2 - Structure & Types of Computer	
2.1	Block diagram of Computer	
2.2	Types of Computer a. Based on purpose: General purpose and Special purpose b. Based on use: Personal and Professional use c. Based on technology: Analog, Digital, Hybrid, Optical, Biological, Chemical & Quantum d. Based on physical size: Micro, Mini, Mainframe and Super Computer	12
	Unit 3–Memory	
3.1	Concept of Memory	
3.2	Types of Memory a. Primary Memory: RAM, ROM, PROM, EPROM, & EEPROM b. Secondary Memory: Hard disk, CD, DVD, USB flash memory, & Solid state memory	12
	Unit 4 – Hardware	
4.1	Concept of hardware, Components of computer: Motherboard, SMPS, Ports, Graphics card, etc	
4.2	Input devices - Keyboard, Mouse, Scanner	12
4.3	Output devices - Monitor: CRT, Flat panel & Touch screen, Printer: Dot Matrix, Ink-jet & Laser, Plotter	
	Unit 5 – Software	
5.1	Concept of software, Types: System software and Application software	
5.2	Operating System: Introduction, types & functions	12
5.3	Application software: word processing, spreadsheet and presentation program	
5.4	Relationship between Hardware and Software	

Reference Books:

- Fundamentals of Computers by V. Rajaraman, PHI

- Fundamentals of Computers by E Balagurusamy, Tata McGraw-Hill Education

- Fundamentals of Computers by Reema Thareja, Oxford University Press India

- Fundamentals of computers by Manoj Wadhwa, International Book House

PRACTICAL IN GEOGRAPHICAL INFORMATION SYSTEM
Skill Enhanced Course (SEC)

Course Outcome:
On successfully completion of this course, the students will able to -
        CO1: Use Arc GIS software efficiently.
        CO2: Understand the concepts and projection and datum for map generation.
        CO3: Generate basic database with Arc GIS software.
        CO4: Perform Query analysis

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	2	1	-	2	-	-	3	1	2	-	3	2	2	3
CO2	2	2	-	-	-	-	-	-	-	-	-	-	-	-	-
CO3	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
WT. AVG	1.67	2.00	1.00		2.00			3.00	1.00	2.00		3.00	2.00	2.00	3.00
							Overall Mapping of Subject								2.06

*In CO-PO Mapping Matrix: a correlation is established between COs and POs in the scale of 1 to 3, 1 being the slight (low), 2 being moderate (medium), 3 being substantial (high), and '-' indicate there is no correlation in respective CO and PO.

Modules at a Glance
Practical in Geographical Information System
(PGGEO105)

Unit No.	Unit	Unit Wise Weightage of Marks (in %)
1	Introduction to GIS Softwares	15
2	Projection and Datum	15
3	Data Generation	15
4	Query analysis	15

	M. Sc. GEOINFORMATICS –I Skill Enhanced Course (SEC) Practical in Geographical Information System SEMESTER:I COURSE CODE:PGGEO105, CREDITS:4 Teaching Hours 48 + Notional Hours 48 = Total hours 96	
Units	**Name of the Sub Topic**	**No of Lectures**
	Unit- I Introduction to GIS Softwares	12
1.1	Introduction to ArcMap and ArcCatalog	
1.2	Visualization of Geographic Datasets, Viewing properties	
1.3	Basic ArcMap features (zoom – in, zoom out, pan etc.) - Symbology view and change	
1.4	Data organization in catalog - Importing data into a Shape file, MDB and GDB, Arc Coverage file	
	Unit – II Projection and Datum	12
2.1	Introduction to coordinate systems - Defining geographic coordinate system	
2.2	Different types of projection systems used in software's	
2.3	Projection to another - Importing coordinate systems - Projection of a text file	
2.4	Datum: Concept, Meaning and Types	
	Unit – III Data Generation	12
3.1	Geo-referencing of Toposheet/Map	
3.2	Digitization of Point, Line & Polygon	
3.3	Creating and Editing digitized features, Topology building	
3.4	Map Composition	
	Unit-IV Query analysis	12
4.1	Attribute data attachment	
4.2	Attribute data handling - Various types of queries and their executions (select by feature, location), Queries attribute data	
4.3	Combine spatial and attribute query - Raster query	
4.4	Raster Calculator	

References

1. Burrough, P. A. and McDonnell, R. A. (2000): Principles of Geographical Information Systems, Oxford University Press, New York

2. Chang, K. T. (2008): Introduction to Geographic Information Systems, Avenue of the Americas, McGraw Hill, New York Longley.

3. Demers, M. N. (2000): Fundamentals of Geographic Information Systems, John Wiley and Sons, New Delhi

4. Heywood, I., Cornelisus, S., Carver, S. (2011): An Introduction to Geographical Information Systems, Pearson Education, New Delhi

5. Korte, G. B. (2001): The GIS Book, Onward Press, Bangalore

6. Lo, C. P., Yeung, A. W. (2002): Concepts Techniques of Geographical Information Systems, Prentice-Hallof India, New Delhi

7. P. A., Goodchild, M. F., Maguire, D. J., Rhind, D. W. (2002): Geographical Information Systems and Science, John Wiley & Sons, Chichester.

AERIAL PHOTOGRAPHY AND PHOTOGRAMMETRY
Discipline Specific Elective (DSE)

Course Outcome:
On successfully completion of this course, the students will able to -

CO1: Understand the basic concepts in Aerial Photography and Photogrammetry.
CO2: Know the errors occurred during capturing remotely sensed data.
CO3: Perform the measurements using the satellite data and Aerial Photographs.
CO4: Learn the real-time ground verification of the various features through the satellite data.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	2	1	-	1	-	-	3	-	2	-	3	2	2	3
CO2	2	2	-	-	-	-	-	-	-	-	-	-	-	-	-
CO3	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
WT. AVG	1.67	2.00	1.00		1.00			3.00		2.00		3.00	2.00	2.00	3.00
										Overall Mapping of Subject					2.07

*In CO-PO Mapping Matrix: a correlation is established between COs and POs in the scale of 1 to 3, 1 being the slight (low), 2 being moderate (medium), 3 being substantial (high), and '-' indicate there is no correlation in respective CO and PO.

Modules at a Glance
Aerial Photography and Photogrammetry
(PGGINF201)

Unit No.	Unit	Unit Wise Weightage of Marks (in %)
1	Introduction to Aerial Photography	15
2	Characteristics of Aerial Photography	15
3	Concept of photogrammetry	15
4	Remote Sensing Data Interpretation	15

	M. Sc. GEOINFORMATICS-I **CORE COURSE** **Aerial Photography and Photogrammetry** SEMESTER:II COURSE CODE:PGGINF201, CREDITS:6 Teaching Hours 60 + Notional Hours 60 = Total hours 120	
Units	**Name of the Sub Topic**	**No of Lectures**
	Unit- I Introduction to Aerial Photography	
1.1	Introduction to Aerial Photography, Historical development	13+2
1.2	Types of aerial photography and uses	
1.3	Introduction to aerial camera, factors affecting image quality	
1.4	Flight Planning and execution – ground control for aerial photography.	
	Unit – II Characteristics of Aerial Photography	
2.1	Photographic resolution and radiometric Characteristics	13+2
2.2	Errors in aerial Photography:	
2.3	Aerial videography - airborne imaging spectrometer	
2.4	Airborne visible - infrared imaging spectrometer (AVIRIS)	
	Unit – III Concept of photogrammetry	
3.1	Definition and historical development of photogrammetry	13+2
3.2	Measurements: Geometry of Aerial Photographs, Determination of Scale, Parallax and height measurement	
3.3	Aerial triangulation - Digital photogrammetry - use of GPS in photogrammetry	
3.4	Digital Photogrammetry: Concept and Techniques, Data Generation and Research Application of Cartosat-1 Data Lidar-altimeter	
	Unit-IV Remote Sensing Data Interpretation	
4.1	Aerial Photo and Image Interpretation: Interpretation of Aerial Photos: Single, Vertical Stereo Pairs.	13+2
4.2	Interpretation of Satellite Imagery: Derived From PAN, LISS, Wifs, OCM Sensors.	
4.3	Study and Visual Interpretation of Satellite Images for Physical Features, Urban, Forest and Agricultural Uses	
4.4	Field Work/Study Tour: Identification of Features in the Field Using Aerial Photographs and/or Satellite Images	

References
1. Joseph, G. (2004). Fundamentals of Remote Sensing. Universities Press.
2. Lillesand, T. M., Kiefer, R. W. & Chipman, J. W. (2008). Remote Sensing and Image Interpretation. John Wiley & Sons.
3. Sabins, F. F. (1996). Remote Sensing: Principles and Interpretation. San Francisco: W.H. Freeman and Company.
4. Jensen, J. R. (2005). Introductory Digital Image Processing. New Jersey: Prentice Hall.
5. Drury, S. A. (2001). Image Interpretation in Geology. Oxford: Blackwell.
6. Campbell, J. (2002). Introduction to Remote Sensing. London: Taylor & Francis.
7. Anji Reddy, M. (2008). Textbook of Remote Sensing and Geographic Information System. Hyderabad: B.S. Publication.
8. Wolf, P .R. (1974). Elements of Photogrammetry, Kogaknscha: McGraw Hill Inc.

CARTOGRAPHY AND DATA REPRESENTATION
Core Course (CC)

Course Outcome:
On successfully completion of this course, the students will able to -

       CO1: Understand the basic elements of Maps.

       CO2: Interpret the SOI Toposheet and various thematic maps.

       CO3: Represent the Statistical Data.

       CO4: Know the recent development in Visualization the map..

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	2	1	-	1	-	-	3	-	2	-	3	2	2	3
CO2	2	2	-	-	-	-	-	-	-	-	-	-	-	-	-
CO3	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO4	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
WT. AVG	1.50	2.00	1.00		1.00			3.00		2.00		3.00	2.00	2.00	3.00
										Overall Mapping of Subject					2.05

*In CO-PO Mapping Matrix: a correlation is established between COs and POs in the scale of 1 to 3, 1 being the slight (low), 2 being moderate (medium), 3 being substantial (high), and '-' indicate there is no correlation in respective CO and PO.

Modules at a Glance
Cartography and Data representation
(PGGINF202)

Unit No.	Unit	Unit Wise Weightage of Marks (in %)
1	Basics of Maps	15
2	Interpretation of Toposheet	15
3	Representation of Statistical Data	15
4	Map Visualization	15

Units	Name of the Sub Topic	No of Lectures
	M. Sc. GEOINFORMATICS-I **CORE COURSE** **Cartography and Data representation** SEMESTER:II COURSE CODE:PGGINF202, CREDITS:6 Teaching Hours 60 + Notional Hours 60 = Total hours 120	
	Unit- I Basics of Maps	13+2
1.1	Basics of Map: Definition, Need, characteristics and Principles Types of Maps History of cartography	
1.2	Elements of maps: Map Scale- Types and Conversion	
1.3	Distortions in maps: angle-area-distance-direction-shape - Transferring geoid information to paper maps - Spherical and Rectangular coordinate systems	
1.4	Map Projection: Concept, Classification, Uses, Types of Projections	
	Unit – II Interpretation of Toposheet	10+5
2.1	Map as a communication system - Theory of Perception - Symbolization: Conventional signs and symbols - quantitative, qualitative symbols – use of colour.	
2.2	Interpretation of SOI Toposheet.	
2.3	Concepts of Cadastral and Thematic Maps	
2.4	Data products for visualization: Survey of India – NRSC- BHUVAN, NATMO – Geological Survey of India, Census of India –National Informatics Centre, Cadastral maps – Open street map – foreign sources of data	
	Unit – III Representation of Statistical Data	10+5
3.1	Data and Data Types: Nominal, Ordinal, Interval and Ratio	
3.2	Qualitative mapping technique – Choroschematic and Chorochromatic.	
3.3	Quantitative mapping techniques: Choropleth - Isopleth	
3.4	Unimodal, Two-Dimensional and Three- Dimensional diagrams	
	Unit-IV Map Visualization	10+5
4.1	Map Generalization: Recent Development in Map Visualization, Animation, Multimedia, Interactive Map	
4.2	Scientific and artistic aspects of design and layout - Overall map designing: size and shape of maps	
4.3	Preparation for presentation - dominance, simplicity, harmony, balance, pattern, variation and contrast	
4.4	Design of internal map elements: map title, legend, scale, grid, direction, border and Annotation. Intellectual design: Map generalization -Map reproduction: Methods of printing	

Reference Books

1. Arthur H. Robinson et al. Elements of Cartography, John Wiley & Sons, New York, 2002.
2. LO, C.P. and Albert K.W.Yeung, Concepts and Techniques of Geographic Information Systems, Prentice-Hall of India, New Delhi, 2006.
3. Misra, R.P. and Ramesh, A., Fundamentals of Cartography, Concept Publishing Company, New Delhi, 2002.
4. Cartwright. W, Gartner G..ALehn (Eds.), Cartography and Art, Springer – Verlag Berlin Heidelberg, 2009.
5. Anji Reddy, M, Geoinformatics for Environmental Management, BS Publications, Hyderabad, 2004.
6. Menno-Jan Kraak, FerjanOrmeling, Cartography Visualization of Geospatial Data, Pearson Education Pvt ltd, New Delhi, 2005.

INTRODUCTION TO STATISTICS
Core Course (CC)

Course Outcomes:

On successfully completion of this course, the students will able to -

CO1: Understand the organisation of data to represent the Statistical Data.

CO2: Perform the Correlation and Regression analysis.

CO3: Understand the fundamentals of Network Analysis.

CO4: Apply the knowledge of statistical techniques in GIS analysis.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	2	1	-	2	-	-	3	-	2	-	3	2	2	3
CO2	2	2	-	-	-	-	-	-	-	-	-	-	-	-	-
CO3	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO4	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
WT. AVG	1.50	2.00	1.00		2.00			3.00		2.00		3.00	2.00	2.00	3.00
											Overall Mapping of Subject				2.15

*In CO-PO Mapping Matrix: a correlation is established between COs and POs in the scale of 1 to 3, 1 being the slight (low), 2 being moderate (medium), 3 being substantial (high), and '-' indicate there is no correlation in respective CO and PO.

Modules at a Glance
Introduction to Statistics
(PGGINF203)

Unit No.	Unit	Unit Wise Weightage of Marks (in %)
1	Fundamental Statistics	15
2	Correlation and Regression	15
3	Network Analysis	15
4	Statistical Techniques and GIS database	15

	M. Sc. GEOINFORMATICS-I **CORE COURSE** **Introduction to Statistics** SEMESTER:II COURSE CODE:PGGINF203, CREDITS:6 Teaching Hours 60 + Notional Hours 60 = Total hours 120	
Units	**Name of the Sub Topic**	**No of Lectures**
	Unit- I Fundamental Statistics	
1.1	Sources, Types, Discrete and Continuous Series, Scales of Measurements.	15
1.2	Organization of Data: Frequency Distribution, Moments of Distribution, Measures of Central Tendency.	
1.3	Inferential statistics: Introduction; Hypothesis Testing - Chi square test, T-test applications; Analysis of variance (ANOVA).	
1.4	Time Series Analysis: growth and decline- index numbers- logarithmic scale- trend line by least square method.	
	Unit – II Correlation and Regression:	
2.1	Types of correlation; Methods of correlation- Spearman s rank correlation and Karl Pearson s coefficient of correlation; Partial Correlation	15
2.2	Correlation: Concepts and Methods Regression: Bi-Variate, Linear, Exponential, Logarithmic, Power Law.	
2.3	Regression: Introduction; Dependent and independent variables; scatter-gram-regression lines and residuals;	
2.4	Construction of regression lines; least square method, Regression residuals: mapping and interpretation.	
	Unit – III Network Analysis	
3.1	Topological graphs -Connectivity- Calculations of Alpha, beta and gamma indices.	15
3.2	Mapping of relative accessibility and connectivity	
3.3	Matrices- point of minimum aggregate travel distance	
	Unit-IV Statistical Techniques and GIS database	
4.1	Interpolation methods: Trend surface analysis, IDW, kriging	15
4.2	DEM, TIN, slope, aspect, hill-shade and view shed	
4.3	Measures of arrangement and dispersion, autocorrelation, semi-variogram,	
4.4	Matrix Algebra: Types and Properties of Matrices; Addition, Subtraction, Multiplication and Inverse.	

References

1. Hammond, R. & McCullagh, P. (1991). Quantitative Techniques in Geography. Oxford: Clarendon Press.

2. Gregory, S. (1978). Statistical Methods for Geographers. London: Longman.

3. Frank, H. &Althoen, S.C. (1994). Statistics: Concepts Applications. Cambridge: Cambridge University Press.

4. Ebdon, D. (1977). Statistics in Geography. Oxford: Basil Blackwell.

5. Rogerson, P.A. (2010). Statistical Methods for Geography. London: Sage Publication

DATABASE MANAGEMENT SYSTEMS: CONCEPTS AND METHODS
Discipline Specific Elective (DSE)

Course Outcomes:
On successfully completion of this course, the students will able to -
  CO1: Understand the structure and importance of Database Management Systems.
  CO2: Manage the Database as per different formats.
  CO3: Apply the knowledge of logical operators in query building.
  CO4: Understand the fundamentals of SQL.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	2	2	-	1	-	-	3	-	2	-	3	2	2	3
CO2	2	2	-	-	-	-	-	-	-	-	-	-	-	-	-
CO3	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO5	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-
WT. AVG	1.67	2.00	2.00		1.00			3.00		2.00		3.00	2.00	2.00	3.00
										Overall Mapping of Subject					2.17

*In CO-PO Mapping Matrix: a correlation is established between COs and POs in the scale of 1 to 3, 1 being the slight (low), 2 being moderate (medium), 3 being substantial (high), and '-' indicate there is no correlation in respective CO and PO.

Modules at a Glance
Database Management Systems: Concepts and Methods
(PGGINF204A)

Unit No.	Unit	Unit Wise Weightage of Marks (in %)
1	Introduction to Database Management Systems	15
2	Managing Database	15
3	Data Sorting and Restricting	15
4	SQL	15

	M. Sc. GEOINFORMATICS-I **Database Management Systems: Concepts and Methods** **Discipline Specific Elective (DSC)** SEMESTER:II COURSE CODE:PGGINF204A, CREDITS:6 Teaching Hours 60 + Notional Hours 60 = Total hours 120	
Units	**Name of the Sub Topic**	**No of Lectures**
	Unit- I Introduction to Database Management Systems	
1.1	Introduction: DBMS, RDBMS, SQL	13+2
1.2	Database Security Concept and Advantages of RDBMS and ER Modeling	
1.3	Control Database Access, Privileges, Creating User,	
1.4	Concept of Role, Creating, Granting Privileges to Role, Revoking Privileges. Changing Password	
	Unit – II Managing Database	
2.1	Managing Schema Object: Data Types, DDL, DML	13+2
2.2	DCL Constraints: Types of Constraints, Primary Key, Foreign Key, Check Constraint, Not Null, Altering Constraint, Concept of Backup Recovery. Overview of Index.	
2.3	Manipulating Dataset using SQL Statement: Basic Select Statement, Selecting Specific Column, Using Arithmetic Expressions	
2.4	Defining Column Alias, using Where Clause	
	Unit – III Data Sorting and Restricting	
3.1	Restricting & Sorting Data: using Comparison Condition (=,<=,>=Etc),	13+2
3.2	Using Logical Operator: AND, OR, NOT, using BETWEEN, LIKE Conditions	
3.3	Rule of Precedence, using Order by Clause	
3.4	SQL Function: Displaying Data From Multiple Tables, Sub-Query	
	Unit-IV SQL	
4.1	Concept of Function, Types, Group Functions, Use of Group by, Having Clause.	13+2
4.2	Types of Joins, Concept of Sub-Query, Types of Sub Queries.	
4.3	Introduction to Pl/Sql, Variables and Types Declaration in Pl/Sql. Simple Program in Pl/Sql: Assignment Operator, Output Statement, Accepting Input from User	
4.4	Simple Program in Pl/Sql Using Table: Syntax of Using 'Select' Statement in Pl/Sql, 'If' Statement and Loops in Pl/Sql. Creating Procedure, Function, Cursor, Trigger, Packages.	

References

1. Deshpande, P. S. (2008): SQL & PL/SQL for Oracle 10g, Blackbook, Dreamtech Press, New Delhi
2. Freeman, R. G. (2000): Oracle DBA 7.3 to 8Upgrade, Dreamtech Press, New Delhi
3. http://docs.oracle.com/cd/B19306_01/server.102/b14220.pdf
4. http://www.smart-soft.co.uk/tutorial.html
5. http://ask2seenu.blogspot.in/2011/09/best-oracle-plsql-ebooks-download-for.html

OPEN SOURCE GIS
CORE COURSE (CC)

Course Outcomes:

On successfully completion of this course, the students will able to -

CO1: Understand the various Open source GIS softwares and databases.

CO2: Generate the Database in raster and vector formats.

CO3: Understand the international standards of Open Geospatial Consortium.

CO4: Know the various web GIS portals.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	2	2	-	1	-	-	3	-	2	-	3	2	2	3
CO2	2	2	-	-	-	-	-	-	-	-	-	-	-	-	-
CO3	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO5	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-
WT. AVG	1.67	2.00	2.00		1.00			3.00		2.00		3.00	2.00	2.00	3.00
										Overall Mapping of Subject					2.17

*In CO-PO Mapping Matrix: a correlation is established between COs and POs in the scale of 1 to 3, 1 being the slight (low), 2 being moderate (medium), 3 being substantial (high), and '-' indicate there is no correlation in respective CO and PO.

Modules at a Glance
Open source GIS
(PGGINF204B)

Unit No.	Unit	Unit Wise Weightage of Marks (in %)
1	Introduction to Open source GIS	15
2	Open source software	15
3	The web and GIS	15
4	Introduction to web portal	15

	M. Sc. GEOINFORMATICS-I **CORE COURSE** **Open source GIS** SEMESTER:II COURSE CODE:PGGINF204B, CREDITS:6 Teaching Hours 60 + Notional Hours 60 = Total hours 120	
Units	**Name of the Sub Topic**	**No of Lectures**
	Unit- I Introduction to Open source GIS	
1.1	Open source GIS: basic concepts	
1.2	Conventional Vs Database modeling with open source GIS	
1.3	Open source GIS platforms, software, Libraries	15
1.4	Open Geospatial Consortium	
	Unit – II Open source software	
2.1	Introduction to Open source software	
2.2	Introduction to QGIS, Development of the software	
2.3	Generation of vector layers, Attaching attribute data	15
2.4	Retrieving properties of vector and raster datasets, Map composition	
	Unit – III The web and GIS	
3.1	Importance of open web mapping, international open web standards as published by the Open Geospatial Consortium	
3.2	The importance of international open standards to developers, users and businesses.	
3.3	Overview of Internet GIS concepts & features: Internet protocol, Domain Name System, Internet services, www, Web servers, Web clients. CGI,	15
3.4	The web and GIS, Web GIS origin and Evolution, -concept-Applications Evolution-Impact-web content-function and interfaces –Mashup design and implementation- challenges and prospects-uses and benefits supporting technology-solution and production	
	Unit-IV Introduction to web portal	
4.1	Concept, uses, functions, architectures, geoportal applications, challenges and prospects.	
4.2	Web page design principles, HTML, XML, data formats, helper applications, Java, databases and the Web Application of Internet services to GIS	15
4.3	Internet GIS software, interoperability issues & Open GIS-GSDI and NSDI, Applications-e-business, e-government	
4.4	Bhuvan, Mosdaik, Vedas	

References

1. Burrogh P.A., (1980) Principles of Geographical Information System for Land Resources Assessment, Oxford Publications.

2. Kang-tsungChang , (2008), Introduction to Geographical Information System, , Fourth Edition, Tata McGraw Hill

3. Pinde Fu and Jiulin Sun, (2010) Web GIS: Principles and applications,ISBN:9781589482456,ESRI.

4. www.vedas.sat.gov.in

INTRODUCTION TO PROGRAMMING LANGUAGE
Skill Enhanced Course (SEC)

Course Outcomes:

On successfully completion of this course, the students will able to -

CO1: Understand the various Programming language.

CO2: Utilise the OOP in handling files.

CO3: Differentiate between OOP and POP.

CO4: Understand the basic concepts of Python.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	2	1	-	1	-	-	3	-	2	-	3	2	2	3
CO2	2	2	-	-	-	-	-	-	-	-	-	-	-	-	-
CO3	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
WT. AVG	1.67	2.00	1.00		1.00			3.00		2.00		3.00	2.00	2.00	3.00
										Overall Mapping of Subject					2.07

*In CO-PO Mapping Matrix: a correlation is established between COs and POs in the scale of 1 to 3, 1 being the slight (low), 2 being moderate (medium), 3 being substantial (high), and '-' indicate there is no correlation in respective CO and PO.

Modules at a Glance
Introduction to Programming Language
(PGGINF205)

Unit No.	Unit	Unit Wise Weightage of Marks (in %)
1	Introduction to C Programming language	15
2	Introduction to OOP	15
3	OOP and POP	15
4	Introduction to Python	15

	M. Sc. GEOINFORMATICS-I **Skill Enhanced Course (SEC)** **Introduction to Programming Language** SEMESTER:II COURSE CODE:PGGINF205, CREDITS:4 Teaching Hours 48 + Notional Hours 48 = Total hours 96		
Units	**Name of the Sub Topic**	**No of Lectures**
	Unit- I Introduction to C Programming language	
1.1	History of Programming language, importance of computer languages, Understanding Compiler.	10+2
1.2	Input /Output functions: Console input output, Formatted input output.	
1.3	Data types and operators: types and uses of various operators.	
1.4	Control structures: Various looping mechanism, types of loops.	
	Unit – II Introduction to OOP	
2.1	Importance of OOP Understanding Classes, objects, Methods and properties.	10+2
2.2	Characteristic of OOP: Abstraction, Inheritance, Polymorphism, Encapsulation.	
2.3	Array and File Handling: Introduction to Array: Understanding Array, Working with Single multidimensional array.	
2.4	Limitations of array, Structure Unions. Introduction to functions: Need of function, defining, calling function, different types of functions. Understanding of pointer. File handling: Reading and writing the data to file	
	Unit – III OOP and POP	
3.1	Difference between OOP and POP Constructors and destructors: Creating classes and objects. Memory allocation of Objects. Heap and stack memory.	10+2
3.2	Managing input /Output File handling: C++ stream classes, formatted I/O manipulators.	
3.3	Access modifiers: modifying access of Classes, methods using public, private keywords.	
3.4	Functions and Operators: Function overloading and Overriding, Operator precedence, Operator overloading, Friend and virtual function.	
	Unit-IV Introduction to Python	
4.1	Installation, Basic Data Type, Syntax, structures	10+2
4.2	Operators, conditional statements, Functions	
4.3	Libraries, Data frames, operations with data frames	
4.4	Modules and Packages	

References

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2. Ebdon, D. (1977): Statistics in Geography, Basil Blackwell, Oxford

3. Frank, H. and Althoen, S. C. (1994): Statistics: Concepts Applications, Cambridge

4. University Press, Cambridge Hammond, R. and McCullagh, P. (1991): Quantitative Techniques in

Geography, Clarendon Press, Oxford

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E. (2006): Object Oriented Programming with C++, Tata McGraw Hill, New Delhi

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7. Kernighan, R. (1998): C Programming Language, (ANSI C Version), Prentice Hall, New Jersey

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14. http://www.ebooksdownloadfree.com/Miscellaneous/C-Black-Book-BI20346.html

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EVALUATION PATTERN OF THEROY PAPERS
M. Sc. GEOINFORMATICS - I
SEMESTER-I and SEMESTER II
(With effect from the academic year 2022-23)
INTERNAL ASSESSMENT- 40 MARKS

Practical Examination will be conducted separately

Evaluation type	Marks
Internal Evaluation	**40**
a) Online Examination	20
b) Class Room Presentation	10
c) Field Visit and report writing d) Project Report e) Attendance Seminar, Conference and workshop f) Paper Presentation in Seminar & Conference g) Making Models (As per the syllabus) h) Free Online Courses	10

EXTERNAL ASSESSMENT- 60 MARKS

- Duration – 2 Hours for each paper.
- There shall be eight questions each of 15 marks on each unit.
- All questions shall be compulsory with internal choice within the questions.

Questions	Sub. Question	Unit	Marks
1	a) OR b)	Based on Unit - I	15
2	a) OR b)	Based on Unit – II	15
3	a) OR b)	Based on Unit – III	15
4	a) OR b)	Based on Unit – IV	15

EVALUATION PATTERN OF PRACTICAL PAPER
M. Sc. GEOINFORMATICS - I
SEMESTER-I and SEMESTER II
(With effect from the academic year 2022-23)
INTERNAL ASSESSMENT- 40 MARKS

Practical Examination will be conducted separately

Evaluation type	Marks
Internal Evaluation	**40**
a) Class Test	20
b) Problem Solving / viva	10
c) Field Visit and report writing d) Project Report e) Attendance Seminar, Conference and workshop f) Paper Presentation in Seminar & Conference g) Making Models (As per the syllabus) h) Free Online Courses i) Assignments	10

EXTERNAL ASSESSMENT- 60 MARKS

- Duration – 3 Hours for each paper.

- Each unit carries 15 marks.

- All questions shall be compulsory with internal choice within the questions.

- **External Examiner/s will be appointed from other university.**

Questions	Unit	Marks
1	Based on Unit - I	15
2	Based on Unit – II	15
3	Based on Unit – III	15
4	Journal + Viva	15