

M.SC. GEOINFORMATICS

SYLLABUS
(with effect from June 2015)



CENTRE FOR GEOINFORMATICS
The Gandhigram Rural Institute – Deemed University
Gandhigram – 624 302 Tamil Nadu

CENTRE FOR GEOINFORMATICS
The Gandhigram Rural Institute – Deemed University, Gandhigram – 624302
M.Sc. Geoinformatics
(Syllabus to be offered from the Academic year 2015 – 16 under the CBCS)

Semester	Category	Course Code	Title of the Paper	No. of Credits	Theory (hours)	Practical (hours)	Duration of ESE (Hours)	Evaluation Marks		Total Marks
								CFA	ESE	
I	Core Courses	15GEOP0101	Introduction to Geoinformatics	3	3		3	40	60	100
		15GEOP0102	Principles of Cartography	3	3		3	40	60	100
		15GEOP0103	IT for Geoinformatics	3	3		3	40	60	100
		15GEOP0104	Fundamentals of GIS	3	3		3	40	60	100
		15GEOP0105	Relational Data Base Management System	3	3	-	3	40	60	100
		15GEOP0106	Practical - I: Geographical Information System	2		4	2	60	40	100
		15GEOP0107	Practical - II: .NET Frame work for GIS	2	-	4	2	60	40	100
	CNCC	15GTPP0001	Gandhi in Everyday Life	-	2	-	-	50	-	50
		15GEOP01F1	Extension / Field Visit	-	2	-	-	50	-	50
				19	19	8	-			
II	Core Courses	15GEOP0208	Basics of Remote Sensing and Photogrammetry	4	4	-	3	40	60	100
		15GEOP0209	Digital Image Processing for Geoinformatics	3	3	-	3	40	60	100
		15GEOP0210	Object Oriented Programming Language	3	3	-	3	40	60	100
		15GEOP0211	Practical -III: Remote Sensing, Digital Image Processing and Photogrammetry	2	-	4	2	60	40	100
		15GEOP0212	Practical -IV: Customization of GIS Software	2	-	4	2	60	40	100
	MC	15GEOP00MX	Modular Course	2	2			50	-	50
	NME		Non Major Elective	4	4		3	40	60	100
CNCC	15ENGP00C1	Communication / Soft Skills	-	2		-	50	-	50	
				20	18	8	-			
III	Core Courses	15GEOP0313	Global Positioning System and its Applications	3	3		3	40	60	100
		15GEOP0314	Application of Geoinformatics	4	4		3	40	60	100
		15GEOP0315	Practical -V: Application of Geoinformatics	2	-	4	2	60	40	100
		15GEOP0316	Practical -VI: Case Study in GIS / RS/ Web GIS	2	-	4	2	60	40	100
		15APRP0003	Research Methods and Statistics	4	4		3	40	60	100

	Major Elective	15GEOP02EX	Major Elective	4	4	-	3	40	60	100
	VPP	15EXNP03V1	Village Placement Programme	2	-	-	-	50	-	50
	MC	15GEOP00MY	Modular Course	2	2	-		50	-	50
	CNCC	15GEOP03F2	Extension / Field Visit	-	2	-	-	50	-	50
				23	19	8	-			
IV	CNCC	15GEOP0417	Dissertation *	6		12		75	75+	200
		15GEOP0418	Internship**	12		24		200	-	200
	4th Semester Total			18				275	125	400
Grant Total (I + II + III + IV)				80	56					

****Internship Evaluation**

150 marks for internship report evaluation

50 marks for viva voce examination conducted by a board of internal examiners

List of Major Elective courses for 15GEOP02EX

15GEOP02E1	Geography
15GEOP02E2	Geology
15GEOP02E3	Watershed Management
15GEOP02E4	Regional Development Planning
15GEOP02E5	Web Technology for Geoinformatics

List of Modular Courses for 15GEOP00MX /15GEOP00MY

- Spatial Decision Support System
- Introduction to Rural Development
- Open Source Software

M.Sc. Geoinformatics

(To be offered from the Academic year 2015 - 16 under the CBCS)

S E M E S T E R - 1
F i r s t Y e a r

CENTRE FOR GEOINFORMATICS

The Gandhigram Rural Institute - Deemed University, Gandhigram - 624302

15GEOP0101	Core Course Introduction to Geoinformatics	3 Credits
Objective: <i>To introduce Geoinformatics as an advance tool consists of various advance science and technologies used for mapping and managing earth resources.</i>		
Specific Objectives of Learning: <ol style="list-style-type: none"> 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 & WebGIS. 5. To apply Geoinformatics in various fields 		
UNIT 1 Geoinformatics	Meaning and Scope of Geoinformatics – Science and Technologies involved: Cartography- Geodesy- Geology- Remote Sensing- Geographical Information System- Photogrammetry - Information & Communication Technologies- Global Positioning System- Digital Image Processing - Map as decision tool.	
UNIT 2 Earth	Earth – Origin, Interior, Age, size, shape and Physiography of the Earth - Sources and methods of acquiring geodata Atmosphere: Origin and nature, Composition and layers of the atmosphere. Fundamental principles of acquiring earth related information: geodetic information - lat - long - time - altimetry – bio-physical and bio-chemical information.	
UNIT 3 Basics Principles of Surveying	Basic principles of surveying – Classification and applications- Scales - Conventional signs - Survey instruments, their care and adjustment - traversing, trilateration and triangulation - conventional, electronic (total station) - Aerial and Satellite based survey techniques (Photogrammetry, RADAR, LiDAR) - Survey by GPS.	
UNIT 4 Geodata Visualalization	Geodata visualization and analysis - two – three – fourth dimension viewing - viewing by animation - Visualization by hyper map - virtual images – web GIS.	
UNIT 5 Applications	Application of Geoinformatics: Rural Development, Geosciences, Agriculture, Forestry, Soil Studies, Meteorology, Military, Transport, Environmental studies, Banking and Health Civil Engineering etc..	

Text Book

1. LO. C.P., and Albert K.W.Yeung, Concepts and Techniques of Geographic Information Systems, Prentice-Hall of India, New Delhi, 2006.

Reference Books

1. Peter A. Burrough and Rachael A. Mc. Donnell, Principles of Geographical Information System, Oxford University Press Inc., New York, 2004.
2. Ian Heywood, Sarah Cornelivs and Steve Carver, An Introduction to Geographical Information System, Pearson Education Pvt .Ltd., New Delhi, 2007.
3. Arthur H. Robinson et al. Elements of Cartography, V Edition, John Wiley & Sons, New Delhi, 2002.
4. Misra, R.P.and Ramesh, A, Fundamentals of Cartography, Concept Publishing Company, New Delhi, 2002.
5. Lillesand M. Thomas and Ralph W.Kiefer, Remote Sensing and Image Interpretation, John Wiley & Sons, New York, 2007.

15GEOP0102	Core Course Principles of Cartography		3 Credits
Objectives <i>To know the basic principles and importance of Cartography, various maps projection/ co-ordinate systems, generalization, different aspects of map design/ layout, and different techniques of map production for reproduction.</i>			
Specific Objectives of Learning: <ol style="list-style-type: none"> 1. To know the basics, importance, and methods of Cartography 2. To study the various maps projection and co-ordinate systems. 3. To learn the different aspects of design in cartography. 4. To learn the generalization and designing aspects of cartography. 5. To study the different techniques of map production and reproduction 			
UNIT 1 Maps	Basics: Map - Definition - Need - characteristics - Components and types of maps Principles and History of cartography.		
UNIT 2 Coordinate systems	Distortions in maps: angle-area-distance-direction-shape - Transferring geoid information to paper maps - Spherical and Rectangular coordinate systems - UTM projection system - classification of projections and applications		
UNIT 3 Map database	Spatial database: Survey of India – NRSC - BHUVAN - NATMO – Geological Survey of India - Census of India –National Informatics Centre - Cadastral maps – openstreet map – foreign sources of data - Physical surveying - GPS and Total station. Attribute database: Census of India- statistical – National Informatics Centre – India stat – year books - other attribute data sources available in Internet for mapping.		
UNIT 4 Mapping Techniques	Map as a communication system - Theory of Perception - Symbolization: Conventional signs and symbols - quantitative, qualitative symbols – use of colour. Qualitative mapping technique - Choroschematic and Chorochromatic. Quantitative mapping techniques: Choropleth - Isopleth		
UNIT 5 Map design and Layout	Scientific and artistic aspects of design and layout - Overall map designing: size and shape of maps - preparation for presentation - dominance, simplicity, harmony, balance, pattern, variation and contrast – lettering - Design of internal map elements: map title, legend, scale, grid, direction, border. Intellectual design: Map generalization -Map reproduction: Methods of printing		

Text Book

1. Arthur H. Robinson et al. Elements of Cartography, John Wiley & Sons, New York, 2002.

Reference Books

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

15GEOP0103	Core Course IT for Geoinformatics	3 Credits
Objective: <i>To introduce the IT tools and its applications in Geoinformatics, and also to learn the basic Computing Skills, Storage Mechanisms Operating Systems, various software and hardware devices.</i>		
Specific Objectives of Learning: <ol style="list-style-type: none"> 1.To expose about the computer, storage devices and other components 2.To know the usefulness of computers in GIS 3.To learn the network security and fundamentals of protecting a system from virus and malwares. 4.To train for in gathering information from the internet through WWW. 5.To explore Google Earth & Google maps. 		
UNIT 1 Computer System	The Computer System - types of computers - foundations of modern technology - microprocessor fabrication - types of memory – buses - Communication with peripherals – server- client concepts and networking.	
UNIT 2 Devices	Input, output and storage : input and output devices - pointing devices - foundations of modern output - display screens – printers - secondary storage - foundations of modern storage - storage media - floppy disk, hard disk drive and optical disk – pen drive - increasing data storage capacity - backing up your data.	
UNIT 3 Software	Software - user interfaces - application programs - Operating systems - file management and utilities - document - centric computing - major software issues - network computing - Information Technology today - Introduction to IT - information system software and data - Global Positioning System - applications of IT in GPS - Information Technology in Remote Sensing - GIS Applications of IT in Cartography - Applications of IT in Real Time GIS.	
UNIT 4 Internet and World Wide Web	Introduction to World Wide Web and Web - Foundations of modern networks - Local Area Network - introduction, architecture and system - introduction of Wide Area Network. Some Internet Applications : Email, Information browsing, WWW, Information retrieval from the web, Other facilities provided by the browser, audio /video/ pictures, animation on the internet -Introduction to applications such as Google maps and Google earth.	
UNIT 5 Security and Ethics	Personal, Social and Ethical Issues: Computers and health - viruses - computer crime – cryptography. Concept of fire wall - network security - wireless technology and security.	

Text Book

1. Dennis P. Curtin, Kim Foley, Kunal Sen & Cathleen Morin, Information Technology - The Breaking Wave, Tata McGraw Hill Ed., 1999. Chapters: 1,2,3,4,5,6,9,10,11&13.

Reference Books

1. Rajaraman V., Fundamentals of Computers, 4/e, Prentice Hall of India, New Delhi, 2008.
2. Alex Leon, Fundamentals of Information Technology, Leon Techno Publications, Chennai, 2008.
3. Brain K.Williams, Stacey C.Sawyer, Sarah E.Hutchinson, using Information Technology, 3/e, TMH publication, 2008
4. Subash Mehta, Global Business Press, Understanding and Using Internet, New Delhi. (1996)
5. Cryptography and Network Security, William Stallings, 1999, 5th Edition, Pearson Education, Inc., publishing as Prentice Hall.

15GEOP0104	Core Course Fundamentals of GIS	3 Credits
Objective: <i>Understand and gather knowledge about the basic principles of GIS.</i>		
Specific Objectives of Learning:		
<ol style="list-style-type: none"> 1. To introduce use of computer in mapping, GIS, components, data structure, modelling, DBMS 2. To learn about encoding methods and editing of data 3. To know various capabilities of GIS 4. To study about various models of GIS 5. To understand output from GIS and SDSS 		
Unit 1 Basics of GIS	Map– computer assisted mapping – GIS -components of GIS – Data used in GIS characteristics of Spatial Data – sources of spatial and attribute data - data structure - raster and vector - GIS approach: Layer – tile – object oriented; Modeling third and fourth dimension - Database Management system: Disadvantages of traditional DBMS – relational database model - integrated spatial and attribute data	
Unit 2 Data input and editing	Encoding methods: Keyboard – digitization – electronic data transfer - Data editing: Checking and correcting errors in spatial and attribute data - transformation – generalization – edge matching - rubber sheeting – building integrated database	
Unit 3 Data analysis	Measurements of length, perimeter and area - queries – reclassification – buffering - overlay - spatial interpolation – surface analysis - network analysis – geo-statistics	
Unit 4 GIS Modelling Basics	Process models: Natural and Scale Analogue Models - Conceptual Models – Mathematical Models - Process Modeling and GIS.- Modeling the Decision Making Process - Visualization Model – TIN – DEM –DTM - Problems in using GIS to Model Spatial Process	
Unit 5 GIS outputs	Maps as output – Thematic Maps - non-cartographic outputs – spatial multimedia – delivery mechanism - GIS and Spatial Decision Support - map as a decision tool	

Text Book

1. Ian Heywood, Sarah Cornelivs and Steve Carver, An Introduction to Geographical Information System, Pearson Education Pvt .Ltd., New Delhi, 2010.

Reference Books

1. Peter A. Burrough and Rachael A. McDonnell, Principles of Geographical Information Systems, Oxford University Press Inc., New York, 2004.
2. M. Anji Reddy, Geoinformatics for Environmental Management, BS Publications, Hyderabad, 2004.
3. David Martin, Geographic Information Systems, Routledge, London,2002.
4. Kang-tsung chang, Introduction to Geographic Information Systems,Tata McGraw – Hill Publishing Company Limited, New Delhi, 2006.
5. C.P.LO and Albert K.W.Yeung, Concepts and Techniques of Geographic Information Systems, Prentice-Hall of India, New Delhi – 2006.

15GEOP0105	Core Course Relational Data Base Management System	3 Credits
Objective: <i>To introduce the RDBMS concepts, data models, design and sql language to the students.</i>		
Specific objectives of Learning:		
<ol style="list-style-type: none"> 1. To understand the importance of Data Base 2. To learn about Data, Data models & structure of Database 3. To know the Normalization and Denormalization concepts of Data Base. 4. To write sql queries for accessing the database 5. To find the applications of Database in GIS 		
UNIT 1 Introduction	Purpose of database systems - view of data - data models - database languages - transaction management - storage manager - database administrator and database users - overall system structure - E-R model: E-R diagram - constraints – keys - weak entity sets - Extended E-R features - design of an E-R database scheme - Reduction of an E-R Schema to tables.	
UNIT 2 Relational model	Structure of relational databases - the relational algebra – Extended relational algebra operations - tuple relational calculus - domain relational calculus - medication of the database	
UNIT 3 Relational commercial language	SQL- Basic structure - set operations, aggregate functions, null values - query-by-example - domain constraints, referential integrity - assertions – triggers – security and authorization - authorization in SQL - encryption and authentication	
UNIT 4 Relational database design	First normal form - pitfalls in relational database design - functional dependencies - Decomposition - Boyce–codd normal form - third normal form, fourth normal form – denormalization - Object-oriented databases: Object-Oriented Data Model - Object-Oriented Languages	
UNIT 5 Transactions	Transaction concept – transaction state – implementation of atomicity and durability - concurrent executions – serializability - Recovery system: failure classifications - storage structure – Recovery and atomicity - log based recovery – shadow paging - recovery with concurrent transaction - Emerging Database Technologies and Applications: Mobile Databases, Multimedia Databases , Geographic Information Systems (GIS).	

Text Book

1. N.F.Korth and A.Silberschatz, S.Sudarshan, Database Management System Concepts, 4/e, McGraw Hill Inc., New Delhi, 2002.

Reference Books

1. B.C. Desai, An Introduction to Database Systems, Galgotia Publications, New Delhi, 1995.
2. R.Elmasri and S.B. Navathe Benjamin Cummings, Fundamentals of Database Systems, Redwood City, 1994.
3. Gordon C.Everest, Database Management, TataMcGraw-Hill, NewDelhi, 2001.
4. Patrick O’Neil and Elizebeth O’Neil, Database Principles, Programme & performance, A Hartcourt publishers International Company, Singapore, 2001

15GEOP0106	<u>Core Course</u> Practical I – Geographical Information System	2 Credits
Objective: <i>To familiarize and learn different GIS Software and capabilities of GIS.</i>		
Specific Objectives of Learning: <ol style="list-style-type: none"> 1. To learn about the GIS software capabilities. 2. To practice the various tools and analysis available and perform query operations, statistical operations & internet capabilities in GIS. 		
<ol style="list-style-type: none"> 1. Map appreciation – map interpretation – thematic layers – map objects – data dictionary 2. Scanning – digitization in CAD 3. Rectification using GPS data, image to image rectification, keyboard entry rectification - setting projections – GIS database design 4. Spatial and attribute data entry and editing and their integration 5. Different methods of selection of spatial and attribute data 6. Working with tables and layers properties 7. Map algebra – raster processing tools – interpolation tools – surface analysis tools - hydrology tools– building models 8. Methods of data analysis: Measurement - Buffer – overlay – network analysis – surface interpolation – reclassification – TIN – DEM– distance tools 9. Geo statistical analysis 10. Design and Layout 		

15GEOP0107	Core Course Practical II- .NET Framework for GIS	2 Credits
Objective: <i>To familiarize and learn .NET framework to help in GIS applications</i>		
Specific Objectives of Learning: To study the various tools in Visual Basic, Visual Studio and RDBMS		
Visual Basic		
<ol style="list-style-type: none"> 1. To programme to understand using VB controls. 2. To programme with Oracle database using ADO control. 3. To programme with DAO control. 4. To simple programmes to display a map in VB. 5. To menu Programme with options zoom in, zoom out, pan. 		
Visual Studio		
<ol style="list-style-type: none"> 1. Create programmes using VB.Net controls 2. Implementing class library object, Inheritance 3. Building graphical inheritance controls 4. Creating Menu and Menu items 5. Creating Multiple-Document-Interface (MDI) 6. Event Handling 7. Validation 8. Exceptions 9. Data Access with ADO.Net 10. Data Binding 11. Using XML Data with VB.Net 12. Finding and Sorting Data in Datasets 		
RDBMS		
<ol style="list-style-type: none"> 1. Creation of Table 2. Indexing 3. Sorting 4. Setting relation between tables 5. Payroll processing 6. Mark list processing 7. Screen building 8. Queries 		

15GTPP0001	Compulsory Non Credit Course Gandhi in Everyday Life
<p>Objectives:</p> <ol style="list-style-type: none"> 1. To understand and appreciate the principles and practices of Gandhi and their relevance in the contemporary times. 2. To develop noble character and attitude to enable the students to cope up with the challenges of daily life 	
<p>Specific Objectives of Learning: To enable students:</p> <ol style="list-style-type: none"> 1. To study in-depth the life and message of Gandhi. 2. To understand the Gandhian way of Management. 3. To practice the Gandhian model of conflict reduction. 4. To lead a humane life on Gandhian lines. 5. To become a Gandhian constructive worker 	
<p>UNIT 1 Understanding Gandhi</p>	<p>Child hood days, Student days, influence of Books and Individuals, Religion, Family, and Social factors. Gandhi as rebel, acquaintance with vegetarianism, as lawyer, encountering and transforming humiliation: in India, in south Africa- train incident, Coach incident, on path way, at court, attack by protesters. Gandhi as political leader and reformer.</p>
<p>UNIT 2 Management</p>	<p>Gandhi's experiments in managing family- Eleven vows, non-possession and sacrifice begin at home – Managing Ashram - community living, service and financial ethics – Managing Social movements- Transvaal March and Salt Satyagraha and nonattachment to position (Nishkama Seva).</p>
<p>UNIT 3 Conflict Reduction</p>	<p>Pursuance of truth and nonviolence ends and means, openness, transparency, love and kindness in handling relationship, nonviolent communication, practicing nonviolence in social and political issues (Satyagraha), conflict resolution practices, art of forgiveness and reconciliation and shanti sena.</p>
<p>UNIT 4 Humanism</p>	<p>Humanism: Trust in goodness of human nature, respect for individual and pluralistic nature of society, dignity of differences, equal regard for all religions (Sarvadharm Samabhava), castes, races, colours, languages etc., simple and ethical life, swadeshi and unity of humankind</p>
<p>UNIT 5 Constructive programmes & contemporary issues</p>	<p>Concept of Sarvodaya, poverty, terrorism, environmental degradation, problems in sharing common resources, health systems and education, science and technology and centralization of power and governance.</p>
<p>Films</p>	<p>Richard Attenborough, Gandhi. Syam Benegal, The Making of Mahatma. Anupam P. Kher, Mine Gandhi Ko Nahin Mara. Peter Ackerman and Jack Duvall, A Force More Powerful</p>

Reference Books

- M.K. Gandhi, (2012) *An Autobiography or The Story of My Experiments with Truth*, Navajivan Publishing House, Ahmedabad.
- . (2003) *Satyagraha in South Africa*, Navajivan Publishing House, Ahmedabad.
- . (1945) *Constructive Programme: Its Meaning and Place*, Navajivan Publishing House, Ahmedabad.
- . (2003) *Key to Health*, Navajivan Publishing House, Ahmedabad
- . (1949) *Diet and Diet Reform*, Navajivan Publishing House, Ahmedabad.

- . *Basic Education*, Navajivan Publishing House, Ahmedabad.
- . (2004) *Village Industries*, Navajivan Publishing House, Ahmedabad.
- . (1997) *Hind Swaraj*, Navajivan Publishing House, Ahmedabad.
- . (2004) *Trusteeship*, Navajivan Publishing House, Ahmedabad.
- . (2001) *India of my Dreams*, Navajivan Publishing House, Ahmedabad.
- K.S.Bharathi (1995) *Thought of Gandhi and Vinoba*, *Shanti Sena*, Sarva Seva Sangh Prakashan, Varanasi.
- V.P.Varma, (1999) *Political Philosophy of Mahatma Gandhi and Sarvodaya*, Lakshmi Narain Agarwal, Agra.
- Louis Fisher (2010) *Gandhi: His Life and Message*.
- B.R. Nanda. (2011) *Mahatma Gandhi: A Biography*, Allied Publishers Private Ltd., New Delhi.
- N.K. Bose. (2008) *Studies in Gandhism*, Navajivan Publishing House, Ahmedabad.
- Gopinath Dhawan, (2006) *The Political Philosophy of Mahatma Gandhi*, Navajivan Publishing House, Ahmedabad.
- N. Radhakrishnan, (2006) *Gandhi's Constructive Programmes: An Antidote to Globalized Economic Planning?*, Gandhigram Rural Institute, 2006

15EXNP01F1	Compulsory Non Credit Courses Extension / Field Visit

M.Sc. Geoinformatics

(To be offered from the Academic year 2015 - 16 under the CBCS)

S E M E S T E R - 2
F i r s t Y e a r

CENTRE FOR GEOINFORMATICS

The Gandhigram Rural Institute - Deemed University, Gandhigram - 624302

15GEOP0208	<u>Core Course</u> Basics of Remote Sensing and Photogrammetry	4 Credits
Objective: <i>To understand the basic concepts of remote sensing, systems & techniques of data acquisition, LIDAR, Hyperspectral remote sensing and data products of different satellites and its applications.</i>		
Specific Objectives of Learning: <ol style="list-style-type: none"> 1. To understand the basic concepts of remote sensing. 2. To study aerial photography, types, planning and execution. 3. To study different photogrammetric principles and techniques. 4. To study basics of LIDAR, RADAR, Microwave remote sensing and its principles. 5. To understand various types of satellite and sensors. 		
UNIT 1 Remote sensing basics	History and development - Electro Magnetic Spectrum - Components and types of remote sensing – Energy interaction with atmosphere and Earth (Rocks, Soil, Water, Vegetation etc.,) - Resolutions (Spectral, Spatial, Temporal & Radiometric) - Platforms – Sensors - Scanning & Orbiting Mechanism of Satellites and Data Acquisition. - Optical Remote Sensing: Basic concepts - Optical sensors and scanners	
UNIT 2 Aerial photography	Historical development - definition - types of aerial photography and uses - aerial videography - airborne imaging spectrometer - airborne visible - infrared imaging spectrometer (AVIRIS) Aerial Cameras - Components of Aerial Cameras. -Planning and execution – ground control for aerial photography.	
UNIT 3 Photogrammetry	Definition, history of photogrammetry - Geometry of vertical aerial photograph, scale of vertical aerial photograph, relief displacement. - Stereoscopic parallax - Aerial triangulation - Digital photogrammetry - use of GPS in photogrammetry	
UNIT 4 Thermal, Microwave & Hyper spectral Remote Sensing	Thermal Remote Sensing: Basic concepts - Thermal sensors & scanners - Thermal Inertia. - Microwave Remote Sensing: Basic concepts - Microwave sensors and Radiometers - Geometric characters - RADAR - Radargrammetry (SLAR / SAR) - LiDAR – LiDAR system - components - operating principles— LiDAR data characteristics - advantages – limitations –comparison with RADAR and photogrammetry – uses of LiDAR data - Hyper spectral Remote Sensing: basic concepts hyperspectral sensors, data formats and systems, AVIRIS, CASI, MODIS and Hyperion.	
UNIT 5 Satellites	Types of satellites – environmental, resource survey satellites, weather and communication satellites, GPS satellites and Shuttle Mission - Major satellite systems: Sensors and data products of IRS, LANDSAT, SPOT, ERS, IKONOS, Quik Bird, ORBVVIEW, ASTER, MODIS, WORLD VIEW and others	

Text Book

1. Lillesand M.Thomas and Ralph W.Kiefer, Remote Sensing and Image Interpretation, John Wiley & Sons, New York, 2007.

Reference Books

1. Sharma V.K., Remote Sensing for Land Resources Planning, Concept Publishing Company, New Delhi, 1991.
2. Paul J. Curran, Principles of Remote Sensing, English Language Book Society, Longman, 1985.
3. Paul J. Gibson, Introductory Remote Sensing: Principles and Concepts, Routledge, London, 2000.
4. Jensen R. John, Remote Sensing of the Environment: An Earth Resource Perspective, Pearson Education Pvt. Ltd., Delhi, 2006.
5. Gottfried Konency, Geoinformation: Remote Sensing, Photogrammetry and Geographic Information Systems, Second Edition, CRC, 2nd edition 2009
6. Paul R. Wolf, Elements of Photogrammetry, Mc Graw – Hill Science, 2001.

Karl Kraus, Photogrammetry, Vol. 1 & II, 4th edition, Dummler, 1997.

15GEOP0209	<u>Core Course</u> Digital Image Processing for Geoinformatics	3 Credits
Objective: <i>To understand the current remote sensing system, Digital Image Processing techniques, classification and Integration.</i>		
Specific Objectives of Learning: After the completion of the course the students will be familiarized with <ol style="list-style-type: none"> 1. To introduce Digital data, format, acquisition and interpretation of various remotely sensed satellite images 2. To know about maps preprocessing and enhancement. 3. To learn about various image classification techniques 4. To learn various DIP techniques used in Hyperspectral Images. 5. To acquire knowledge on various outputs and other techniques. 		
Unit 1 Introduction to Digital data	Digital Data: Basic Characteristics of digital image - data type and file format. Data acquisition and interpretation - Use of multiple images - multi-station – multi-band – multi-date - multi-stage – multi-polarization – multi-direction – multi-spectral	
Unit 2 Image Preprocessing and Enhancement	Digital Image Processing: Introduction - stages in digital image processing - Preprocessing: geometric correction, atmospheric correction and radiometric correction - Image Enhancement: stretch, Single Band Enhancement (Image reduction & Magnification, Contrast Stretching, Filtering & Edge enhancement) - Multiband Enhancement (Band ratioing, color composite generation, Principal Component Analysis, NDVI).	
Unit 3 Image Classification	Image Classification: Unsupervised classification - Supervised classification technique - training sites - classification stage - minimum distance to mean classifier – parallelepiped classifier - maximum likelihood classifier - Hybrid Classification – Sub Pixel Classification - Fuzzy Classification - accuracy assessment -	
Unit 4 Hyperspectral Image Processing	Hyperspectral Image Processing: Data cube, Hyperspectral Profiles, Data Redundancy, - Problems with Dimensionality, Principal Component, Minimum Noise Fraction (MNF) - Atmospheric Correction, Pixel Purity Index, Empirical line Calibration - Reflectance Transformation, Continuum Removal - Spectral feature Fitting, Spectral Angle mapper	
Unit 5 DIP outputs & other Techniques	Output Generation: graphic products - tabular data - digital files -post classification smoothing - data merging - change detection procedures - image transmission and compression.	

Text Book

1. John R Jenson, “Introducing Digital Image Processing”, Prantice Hall. New Jersey 1986.
2. Lillesand M. Thomas and Ralph W.Kiefer, Remote Sensing and Image Interpretation, John Wiley & Sons, New York, 2007.

Reference Books

1. Jensen R. John, Remote Sensing of the Environment An Earth Resource Perspective, Pearson Education Pvt. Ltd., Delhi, 2006.
2. Gibson, Paul.J. and Clare H. Power, Introductory Remote Sensing: Digital Image Processing and Applications, Routledge, London, 2000.
3. Milman S. Andrew, Mathematical Principles of Remote Sensing making Inferences from Noisy Data, Ann Arbor Press, Noida, 1999.
4. Paul J. Curran, Principles of Remote Sensing, English Language Book Society, Longman, 1985.
5. John A. Richards, Springer-Verlag, Remote Sensing Digital Image Analysis, 1999.
6. Digital Image Processing (3rd Edition) Rafael c.Gonzalez,
7. Richard E.Woods Prentice Hall, 2007.

15GEOP0210	<u>Core Course</u> Object Oriented Programming Language (OOPs)	3 Credits
Objective: <i>To expose the students about Object Oriented Programming concepts in C++, it's Datastructure and basics about Python language.</i>		
<u>Specific Objectives of Learning</u>		
<ol style="list-style-type: none"> 1. To understand OOP concepts 2. To learn to write programs in C++ 3. To get basic knowledge about python 		
Unit 1	Procedural vs object oriented languages - basic concept of OOP - benefits of OOP - applications of OOP - C++ programming basics - C++ statements - data types and derived data - the concept of objects - overloading and reusability - key words - Simple programme	
Unit 2	Functions and classes - structure and structure variables - functions, passing arguments and overload functions - objects - classes - arrays - C++ objects - object and function arguments - classes - private and public members - constructors and destructors - arrays of objects - operator overloading	
Unit 3	Inheritance, multiple inheritance - overriding - pointers, functions, strings and memory management - Files and streams: file variation and structures - streams and stream class hierarchy - redirection - class libraries - user defined class library	
Unit 4	Introduction to Python – Variables - control structures - looping statements - functions- Strings- Data structures - classes – objects - Inheritance - polymorphism	
Unit 5	Files-String - String formatting - reading and writing files - Exception handling	

Text Books

1. Balagurusamy E., Object Oriented Programming with C++, Tata McGraw Hill, 2001.
2. Toby Donaldson, Visual Quick start Guide Python, 2e, Perason Education Inc, South Asia, 2009.

Reference Books

1. Rober Lafore, Object Oriented Programming in Turbo C++, Galgotia Publication, 2002.
2. The C++ Programming language, Bjarne Stroustrup Addition-wesly Publishing Company, New York, 1994.
3. Mark Summerfield, Programming in Python 3, Pearson Education Inc, South Asia, 2009

15GEOP0211	Practical -III Remote Sensing, Digital Image Processing and Photogrammetry	2 Credits
-------------------	---	----------------------------

Objective: *To provide practical and hands on experience on visual interpretation elements, digital image processing and some extent in 3D visualization.*

REMOTE SENSING AND PHOTOGRAMMETRY

1. Stereovision Test and Anatomy of pocket & Mirror Stereoscopes.
2. Decoding, Marking & Transfer of Principal Points, Base line drawing, Flight line marking, 3D Observation, Tracing details, Transfer the details to base map.
3. Interpretation of Aerial photographs
4. Study of various visual Remote Sensing Equipments
5. Decoding of different satellite data
6. Interpretation of Black & White and false color multi band imagery
7. Interpretation of thermal and microwave imagery
8. Transfer of information from Imagery to Base map

DIGITAL IMAGE PROCESSING

1. Reading and displaying satellite data from BIL,BSQ and BIP formats
2. Generating True, False and Pseudo Colour Composite (FCC)
3. Extracting / Subset, Area of Interest (AOI)
4. Measuring length, distance and area.
5. Generating histograms of various bands
6. Georeferencing the base image, Image to Image, Map to Image – Geometric correction of satellite image
7. Mosaic
8. Enhancement using different filtering techniques, Image Fusion
9. Principal Component Analysis (PCA)
10. Band ratio and NDVI
11. Unsupervised Classification – Cluster - Iso cluster
12. Supervised Classification
13. Accuracy Assessment
14. Change detection study
15. Layout Preparation
16. Hyper spectral Image Analysis

15GEOP0212	Practical- IV Customization of GIS Software	2 Credits
Objective: <i>To customize GIS software in ArcObjects, WebGIS and Image Processing using MATLAB</i>		
Customization Using ArcObjects		
<ol style="list-style-type: none"> 1. Create simple toolbar in ArcGIS 2. Customize a button control 3. Simple programme using Arcobjects to zoom in, zoom out, pan in Arcmap 4. Programme to work in Arcobjects 5. Installing pythonwin in Arcmap 6. Create modules in python 7. Programmes to integrate python with Arcmap 		
ASP.NET/HTML/PHP		
<ol style="list-style-type: none"> 1. Programme to create a simple webpage in ASP.NET 2. Create a registration form for Gmail/Yahoo/Rediff Using HTML 3. Install WAMP server with PHP 4. Create simple applications using PHP 5. Develop a webpage to display maps. 6. Project to create a dynamic websites using HTML/ASP.NET/PHP 		
Image Processing- MATLAB		
<ol style="list-style-type: none"> 1. Basic programme to understand matlab 2. Programme to display a map 3. Programme to enhance a map image 4. Apply algorithm in map images 5. Simple programme to remove cloud cover in MATLAB 		

NON MAJOR ELECTIVE

15CSKP00C1	Compulsory Non Credit Course Communication and Soft skills
Objectives:	
<ol style="list-style-type: none"> 1. <i>To develop inter personal skills and be an effective goal oriented team player.</i> 2. <i>To develop professionals with idealistic, practical and moral values.</i> 3. <i>To develop communication and problem solving skills.</i> 4. <i>To re-engineer attitude and understand its influence on behavior.</i> 	
UNIT 1	SELF ANALYSIS SWOT Analysis, Whom am I, Attributes, Importance of Self Confidence, Self Esteem
UNIT 2	ATTITUDE Factors influencing Attitude, Challenges and lessons from Attitude. Change Management Exploring Challenges, Risking Comfort Zone, Managing Change
UNIT 3	MOTIVATION Factors of motivation, Self talk, Intrinsic & Extrinsic Motivators
UNIT 4	GOAL SETTING Wish List, SMART Goals, Blue print for success, Short Term, Long Term, Life Time Goals. - Time Management Value of time, Diagnosing Time Management, Weekly Planner To do list, Prioritizing work.
UNIT 5	CREATIVITY Out of box thinking, Lateral Thinking Presentation

M.Sc. Geoinformatics

(To be offered from the Academic year 2015 - 16 under the CBCS)

S E M E S T E R - 3

S e c o n d Y e a r

CENTRE FOR GEOINFORMATICS

The Gandhigram Rural Institute - Deemed University, Gandhigram - 624302

15GEOP0313	Core Course Global Positioning System and its Applications	3 Credits
Objectives: <i>To study GPS surveying and its application</i>		
Specific Objectives of Learning: 1. To learn fundamental of GPS. 2. To know different GPS satellites and Systems. 3. To understand different types of GPS & its techniques. 4. To calculate error & basics of LASS & WASS. 5. To apply GPS in various field.		
UNIT 1 Basics of GPS	History of GPS - Advantages and limitations of GPS - Segments of GPS - Control segment - Space segment - User segment - Geo positioning: Point positioning - Relative Positioning. Static Positioning – Kinematics Positioning- Uses of GPS	
UNIT 2 GPS systems	NAVSTAR GPS – GALILEO – GLONASS – IRNSS – MTSAT - Beidou - Compass. GPS receivers based on: data type and yield - realization of channel –user community. Signal structure: carrier ranging, - ranging code and navigational message - WAAS & LAAS	
UNIT 3 GPS surveying	Basic modes of GPS surveying: Differential GPS surveying vs static GPS surveying. Rapid static positioning technique -Reoccupation technique- Stop & go technique Kinematic positioning technique - Relative advantages and disadvantages - Data transfer and analysis	
UNIT 4 Sources of error	Ionospheric and atmospheric delays - satellite and receiver clock error - anti spoofing selective availability - multi path - dilution of precision - Error correction - Number and geometry of visible satellites - location of GPS receiver - distance between base station and rover receiver - signal to noise ratio - occupation time at a point - differential correction	
UNIT 5 GPS applications	Siting and routing - surveying - navigational application - vehicle tracking - mobile computing - military application - Precision Farming - Utilities	

Text books

1. Satheesh Gopi, Global Positioning System Principles and Applications. Tata McGraw-Hill Publishing Company Limited, New Delhi, 2005.
2. Ahmed el Rabbany, Engineer's Guide to GPS (Mobile Communications Library) (English) 1st Edition, Artech House Publishers, 2002

Reference Books

1. Hofmann-Wellnhof.B, Lichtenegger.H, and Collins.J, GPS theory and Practice, Springer (India) Private Limited, New Delhi, 2007.
2. <http://www.palowireless.com/gps/>
3. Michael Kennedy, 'The Global Positioning System and GIS: An Introduction', Taylor and Francis Inc. New York, 2002.
4. Leick Alfred, GPS Satellite Surveying, Third Edition, John Wiley & Sons, Inc., Hoboken, New Jersey, 2004.
5. <http://www.maps-gps-info.com/ed-resources.html>
6. <http://www.gisdevelopment.net/tutorials/tuman004.htm>
7. http://www.colorado.edu/geography/gcraft/notes/gps/gps_f.html

15GEOP0314	Core Course Application of Geoinformatics	4 Credits
Objectives: <i>To Make the students to formulate, plan, execute and manage Geoinformatics for Various Applications.</i>		
Specific objectives of Learning: To apply Geoinformatics in 1. Land resource management 2. Water Resources Management 3. Disaster mitigation and management 4. Utility management 5. Environmental management		
UNIT 1 Land Resource Management	Introduction – importance – problems - soil erosion estimation using RUSLE/ USLE Land Classification System – FAO- USDA- land capability assessment – crop suitability – Land use / Land cover – classification – change detection - land use planning: Rural and urban - Land Reclamation –Land Information System - DSS for Land use planning and management	
UNIT 2 Water Resource Management	Introduction – importance - water pollution – Water Conservation - Ground water investigation - artificial recharge zone identification – Command area Program water quality monitoring - surface water harvesting structure - flood prediction - Model - sedimentation evaluation - watershed approach for natural resource management – runoff and hydrological modeling	
UNIT 3 Disasters and Calamities	Definition - Classification – Causes - Earthquakes – Landslides - Volcanism - Tsunami Cyclones – Floods - Drought - Forest Fire - Vulnerability – Hazard – Risk Assessment - Natural Disaster Mapping, Management and mitigation using Remote Sensing and GIS.	
UNIT 4 Facilities Management	Infra structure demand analysis - Transportation interaction models – intelligent transportation systems - Transportation planning – mapping transportation - network – classification – optimum route – alignment planning – traffic and parking studies accident analysis - Water utility and electrical utility -telecommunication – tower spotting – route optimization – other utilities - Sitting a new facility - customer loyalty studies - health information system - Crime Analysis: mapping crime data - hot spot analysis - solid waste management	
UNIT 5 Environmental Management	Environmental types and components – pollution: Air – Water – Soil and Noise – Environmental Impact Assessment - Environmental Information System - GIS and RS in Environmental Studies - Environmental and ecological concerns – resource development in remote areas - impacts of anthropogenic activities	

Text Books

1. Fundamentals of Remote Sensing. George Joseph. Universities Press (India) Pvt Ltd, 3-5-819 Hyderguda, Hyderabad 500 029. 2003. 433 pp.

Reference Books

1. Lo.C.P. and Yeung, Albert KW, Concepts and Techniques of Geographic Information System, Prentice Hall of India, 2002.
2. Robert Laurini and Derek Thompson, Fundamentals of Spatial Information Systems, Academic Press, 1996.
3. Laura L., Managing Natural Resources with GIS, ESRI Press, 1998.

4. Alan L., MD Melnick, Introduction to Geographic Information Systems for Public Health, Aspen Publishers, 1st Edition, 2002.
5. Amim Hammad, Hassan karimi, Telegeoinformatics: Location-based Computing and Services, CRC Press, 1st Edication, 2004
6. Allah Brimicomber, GIS Environmental Modeling and Engineering, Taylor and Francis, 2003
7. Savigny D De and Wijeyaratne.P.GIS for Health and Environment, Stylus publication, 1994.
8. Paul A Longley, Michael F Goodchild, David J Maguire, David W Rhind, Geographical Information Systems, Volume I and II,John Wiley and Sons, Inc., 1999.
9. Van Dijk M.G.Bos, GIS and Remote Sensing Techniques in Land-And-Water-Management, Kluwer Academic Publishers, 2001.
10. Juliana Maantay, John Ziegler and John Pickles, GIS for the Urban Environment, ESRI Press, 2006.
11. Laura Lang, GIS for Health Organizations, ESRI Press, 2000.
12. Lisa Godin, GIS in Telecommunications Managements, ESRI Press, 1st Edition, 2001.
13. Applications in Coastal Zone Research Management, Martin, K.St. (ed), U.N. Institute for Training and Research, 1993.
14. Integrated Ocean and Coastal Management, Sain, B.C., and Knecht, R.W.,UNESCO Publication, 1998.

15GEOP0315	Core Course Practical V – Applications of Geoinformatics	2 Credits
<ol style="list-style-type: none"> 1. Preparation of various thematic maps: Drainage – TIN – DEM – slope - aspect – land use/ land cover – depth of water table – lineament - soil – geology – geomorphology. 2. Land resource management: Change detection in various land use/ land cover types and cross tabulation - land capability assessment - soil erosion estimation - Village GIS- urban sprawl 3. Water resource management: Watershed delineation and identification of suitable site for constructing water harvesting structures – assessing the water holding capacity of a dam 4. Hydrological modeling - drought assessment – metrological, agricultural, hydrological and socio-economic drought - locating site for artificial recharge zone – water quality assessment 5. Disaster management – flood – landslide 6. Facilities management: Locating site for cell phone tower using visibility analysis 7. Network Analysis - shortest path – best path – service area – OD cost matrix - Location and Allocation - route tracing – proximity analysis – site suitability –address matching – 8. Drainage analysis 9. Environmental management: Climate change – land surface temperature – evapo-traspiration – impact – sea level rise – biomass estimation. 10. 3D mapping - Animation - hypermap 		

15GEOP0316	Core Course Practical-VI: Case Study in GIS / Remote Sensing / WebGIS	2 Credits
<p>Objective: <i>On completion of study of this subject, students would have a sound knowledge about the GIS / Remote Sensing / Web GIS Web GIS and its Applications</i></p>		
<ul style="list-style-type: none"> ▪ Identification of a problem in consultation with internal guide ▪ Executing the work as per the instructions of both internal and external guide while incorporating any of the following activities or combination of activities <ul style="list-style-type: none"> ▪ Designing of Geoinformatics ▪ GIS implementation and application ▪ Map server design ▪ RS application ▪ GPS application ▪ Spatial modeling or such other related topics, which will give focus to Geoinformatics implementation ▪ The size of the dissertation may be between 50 and 70 pages, which is not inclusive of scripts and other appendices <p>The dissertation should be submitted both in print form and digital form (pdf / crystal reports).</p>		

15APRP0003	Core Course Research Methods and Statistics	4 Credits
Objectives: <i>To enable the students understand the basics of research methodology, and To develop skill in preparing research report</i>		
Specific Objectives of Learning: Upon completion of the course, the students will be able to: <ol style="list-style-type: none"> 1. Identify and formulate a problem for research. 2. Prepare suitable research design to study a research problem to be formulated 3. Choose appropriate methods of sampling, tools and techniques of data collection 4. Process the data collected in the field and to analyse using appropriate statistical methods 5. Prepare research report in a professional manner. 		
UNIT 1 Introduction	Research – definition - objectives-types. Research Process- Identifying and prioritizing problems - theoretical framework – review of literature, variables -its types– Hypothesis – formulation and types	
UNIT 2 Research Design	Explorative; Experimental, descriptive, Case study and survey methods. Content Analysis, Intervention and Interdisciplinary Studies, Mixed methods.	
UNIT 3 Data Collection	Sampling and non-sampling techniques - Data collection methods – interview, schedule, Questionnaire, and observation. Online research methods, psychological tests, projective techniques. Validity and reliability of scales - Research Report - Components and format of research report - Reference materials, quotations, bibliography, footnotes, glossary and appendix, dissemination of findings	
UNIT 4 Descriptive Statistics	Measures of central tendency, dispersion, skewness and kurtosis – Correlation of Analysis, Association of attributes Multiple regression and correlation analysis, concepts of Factor analysis. Statistical software and its uses.	
UNIT 5 Inferential Statistics	Basic concepts and Hypothesis testing and Estimation; Steps in hypothesis testing. Tests for Large and small samples – Z test, t-test and F-test, Chi-square test, Mann-Whitney test, and ANOVA	

Reference Books

1. Gupta S.P.& M.P.Gupta, Business Statistics, New Delhi:Sultan Chand & Sons, 2006
2. Shajahan Dr. S., Research Methods for Management (Text and Cases), New Delh: Jaico Publishing House, 2006.
3. Hooda R.P., Statistics for Business and Economics, New Delhi Macmillan Ltd., 2003.
4. Beri G.C., Marketing Research, New Delhi: Tata McGraw-Hill Publishing Company Limited, 2000.
5. Donald R.Cooper, Business Research Methods, New Delhi : McGrew-Hill International Editions, 1998.
6. Vijayalakshmi G. & Sivapragasam C., Research Methods: Tips and Techniques, Chennai : MJP Publishers, 2009.
7. Krishnaswamy O.R, Methodology of Research in Social Sciences, Himalaya Publishing House, Bombay, 2002.
8. Kothari C.R, Research Methodology, Wishva Prakashan, New Delhi, 2001.
9. Donald R Cooper and Ramela S. Schindler, Business Research Methods, Tata McGraw Hill Publishing Company Limited, New Delhi, 2000.
10. Uma Sekaran, Research Methods for Business, John Wiley and Sons Inc., New York, 2000.

15GEOP03E1	<u>Major Elective</u> Geography	4 Credits
Objectives: <i>To explain about the concept of Geography, and its various branches</i>		
<p><u>Specific Objectives of Learning:</u> They will be knowledgeable in geography, geomorphology, climatology, and oceanography</p> <ol style="list-style-type: none"> 1. To study the basics, scope and branches of Geography 2. To understand different Landforms form by different geomorphic process 3. To understand weather and its related phenomena. 4. To understand cyclones, wind and its role towards the environment. 5. To study coastal and its process. 		
UNIT 1 Geography	Basics of Geography – Scope – approaches to study geography: systematic – regional – regional – methods - and techniques of geography: cartography – quantitative – regional – branches of geography	
UNIT 2 Geomorphology	Geomorphology - nature and scope – application of geomorphic techniques - Solar system – Origin of the earth – constitution of the earth - earth’s interior – origin of continents and ocean basins - concept of plate tectonics – earth movements: orogenetic and epigenetic movements – Isostasy – Mountain buildings Earthquakes – Volcanoes – Rocks – origin – types characteristics; - geomorphic agents and process- de weathering - Fluvial landscape – Fluvial cycle; Karst topography – Coastal topography; Glacial landscape – Eolian landscape	
UNIT 3 Climatology	Definition: Weather – Climate Significance of climatology – Climatic elements – Surface composition and structure of the atmosphere – Insulation - Horizontal and vertical distribution of temperature - Range of temperature – Diurnal, seasonal and annual	
UNIT 4 Atmosphere	Atmospheric pressure and winds – Vertical and horizontal distribution of pressure – Planetary, periodic and local winds – Atmospheric moisture – Condensation forms and precipitation – Types – Spatial and seasonal - Air masses and fronts – Concepts – Classification and properties - Atmospheric disturbances - Tropical cyclones – Temperate cyclones and anti-cyclones	
UNIT 5 Oceanography	Definition of oceanography – Surface configuration of the ocean floor – Continental shelf, slope, deep sea plain and deeps – Submarine relief of Atlantic, Pacific and Indian Oceans - Distribution of temperature and salinity in the seas and oceans - Circulation of oceanic waters - Waves, tides and currents - Marine deposits and coral reefs – Darwin and Daly’s theory on coral reefs.	

Reference Books

1. Thornbury, W. D. (1960): Principles of Geomorphology, John Wiley and Sons, New York.
2. Chorley, R. J., Schumm, S. A. and Sugden, D. E. (1984): Geomorphology, Methuen, London
3. Strahler A. H and Strahler, A. N. (1992) : Modern Physical Geography, John Wiley, New York
4. Savindra Singh (2002): Physical Geography, Prayag Pustak Bhawan, Allahabad.
5. D. S. Lal: Climatology. Sharda Pustak Bhawan ,11 , University road Allahabad- 211002 Edition 2003
6. Frederick K. Lutgen, Edward Tar buck: “The Atmosphere An Introduction to Meteorology” Prentice Hall,
7. Englewood Cliffs ,New Jersey 0762 ,1998
8. Trewartha : Introduction to Weather and Climate.
9. H.J. Critchfield (1993): General Climatology. Prentice Hall, New Delhi

15GEOP03E2	<u>Major Elective Courses</u> Geology	4 Credits
<p>Objective: <i>To introduce basic geology subjects to the Geoinformatics student especially non geology candidates.</i></p>		
<p><u>Specific Objectives of Learning:</u> On completion of this course, student will be able to recognize geological features using image characteristics and will be able to perform image processing and can interpret satellite images for possible earth resources.</p> <ol style="list-style-type: none"> 1. The structure of earth, geological structures and tectonic activities 2. The concepts of various geomorphic units, unconformity 3. Minerals, rock types, occurrence and distribution and economic minerals in India 4. Various geophysical methods for Resources Inventory 5. The use of geological techniques for natural resources inventory 		
<p>UNIT 1 Introduction to Geology</p>	<p>Introduction: Geology for natural resources inventory - Branches of geology – Scope - Interior of the Earth - Stratigraphic sequence, Geological Time scale - Weathering, - Introduction to geological structures - Plate Tectonics – Earthquake and volcanic belts in India</p>	
<p>UNIT 2 Geomorphic and Structural landforms</p>	<p>Landforms and geomorphic process – Classification - Description of Structural, Denudational, Tectonic Fluvial, Glacier, Aeolian and Coastal landforms - Drainage pattern and Morphometry - Primary and Secondary structures - Dip - Strike - Foliation and Lineation - Folds- faults – Joint – Unconformity</p>	
<p>UNIT 3 Minerals & Rocks</p>	<p>Introduction to Minerals – Physical properties - Chemical properties - Rock Cycle – Classification and description of rocks - Forms and mode of occurrence of rocks – Physical properties of important rocks and ore forming minerals - Distribution of economic minerals in India.</p>	
<p>UNIT 4 Geophysical Exploration</p>	<p>Geophysical methods - Seismic, Electrical, Gravity - Magnetic and aeromagnetic methods - their bearing on Resources Inventory</p>	
<p>UNIT 5 Applications</p>	<p>Resources Inventory: Mineral – Water – hydrocarbon – Soil resources - Natural Disaster Management and Mitigation – Engineering Applications : Site selection & Construction of major structures like Dam, Tunnel, Road, Railway etc. - Artificial recharge structure, Natural disaster mitigation structures</p>	

Reference Books

1. Arthur Holmes, (1992) Principles of Physical Geology, Edited by Duff.P.McI.D.4th Ed. Chapman and Hall, London.
2. Billings, M. P. Structural Geology, Prentice-Hall, Inc, New Jersey, USA, 1972
3. George Joseph, Fundamentals of Remote Sensing, Second Edition, Universities Press (India) Private Limited, 2005 ISBN 8173715351, 9788173715358.
4. Lillesand, T.M., Kiefer, R.W and Chipman, K.W. Remote sensing and image interpretation Fifth Edition. Wiley. 2007.
5. Ravi P. Gupta, Remote Sensing Geology, Springer-Verlag New York, 2002.
6. Burrough, PA; and RA McDonnell. Principles of Geographic Information Systems. Oxford Press, U.K., 1998.
7. Wolf. P. R. Elements of Photogrammetry. Mc Graw Hill, Japan, 1993.
8. G. Rees. Physical Principles of Remote Sensing. Cambridge University Press, U.K., 2000.
9. SN Pandey, Principles and Applications of Photogeology: New Age International (P) Ltd., New Delhi. 1988.
10. Schowengerdt, R. A., Remote sensing - Models and methods for image processing. Academic press. London.1997.
11. Richards,J.A, Remote Sensing Digital Image Analysis., Springer-Verlag, London 1986.
12. Duda R.O & Hart PE, Pattern classification & Scene Analysis.. Wiley, New York, 1973.
13. Morton Nadia & Eric Smith P, Pattern Recognition Engineering. John Wiley, New York, 1993.
14. Robert Laurini and Derek Thompson, Fundamentals of Spatial Information Systems, Academic Press. London. 1996.
15. Groundwater Hydrology, Todd.D.K. 1988, John Wiley & Sons.
16. H.M.Ragunath, 1983, Ground water, John Wiely & Sons Ground water and wells.

15GEOP03E3	<u>Major Elective Courses</u> Watershed Management	4 Credits
Objective: <i>To explain about meaning of watershed, watershed dev. Programmes, use of Geoinformatics in watershed development, methods of monitoring and evaluation, areas of evaluation</i>		
<p><u>Specific Objectives of Learning:</u> the students will gain knowledge in watershed, watershed dev. Programmes, use of Geoinformatics in watershed development, various methods of monitoring and evaluation, areas of evaluation of watershed development.</p> <ol style="list-style-type: none"> 1. Define goals and objectives towards watershed management. 2. Understand Federal, State, regional, and local policies as they apply to watershed management. 3. Delineate a watershed utilizing Geoinformatics mapping techniques. 4. Develop and implement a watershed management plan by preparation of various thematic maps. 5. Monitoring, evaluation, PRA methods and financial frameworks needed for successful implementation of a watershed management plan. 		
UNIT 1	Watershed – definition – causes and consequences of watershed deterioration - Watershed delineation and codification – watershed approach – advantages – watershed as a unit of planning - Watershed management – approach to watershed development – principles and components of watershed management	
UNIT 2	Integrated Watershed Management Programme: Introduction – institutional arrangements – livelihood orientation – cluster approach – scientific planning – capacity building – multi tier approach - Criteria for selection of watershed projects – project management: Preparatory phase – work phase – consolidation and withdrawal phase executed	
UNIT 3	Role of Geoinformatics in scientific planning: Baseline survey/ bench mark survey - evaluation of deterioration – watershed delineation – acquiring data – preparation of various thematic maps – scientific planning	
UNIT 4	Monitoring – evaluation – learning – outcome/ result - Monitoring: Meaning – factors – indicators	
UNIT 5	Evaluation - focus – need for – types of evaluation; Participatory evaluation – community participation – PRA methods of Evaluation; Depth of water table – cropping pattern – area under biomass – various Land use/ land cover – water body	

Text Books

1. N.D. Mani, Watershed Management: Principles, Parameters and Programmes, Dominant Publishers and Distributors, New Delhi, 2005

Reference Books

1. Paul A.DeBarry, PE,PH,APSS, “Watersheds Process, Assessment and Management”, Wiley Student Edition, New Jersey, 2004
2. Srivastava, O.N. and Y.V. Rao, "Impact of Integrated Wasteland Development Programme (IWDP) - A Study in Uttar Pradesh, National Institute of Rural Development, Hyderabad, 2001.
3. Raj Vir Singh, "Watershed Planning and Management", Yash Publishing House, Bikaner, 2001.
4. E.M. Tideman, “ Watershed Management guidelines for Indian Conditions”, Omega Scientific Publisher, New Delhi, 2006
5. J.V.S.Murty, “Watershed Management”, New Age International, New Delhi, 2007

15GEOP03E4	Major Elective Courses Regional Development Planning	4 Credits
Objective: <i>To explain about regional planning, types and process of regional planning</i>		
Specific Objectives of Learning: Students will gain knowledge on <ul style="list-style-type: none"> • Objectives of planning, types of planning • Types of region and goals of regional planning • Fundamental considerations of planning region • Information system for regional development • The process involved in regional planning 		
UNIT 1	Development Planning - meaning and objectives of planning- Rational for Planning in developing countries - Types of Planning - regional planning as an approach of development planning	
UNIT 2	Concept of Regional and Regional Planning - Regional inequality - homogenous region nodal - adhoc region - functional region, goals and objections of regional planning - It is an interdisciplinary technique - Hierarchy of regions - methods - scalogram - sociogram - Bisection	
UNIT 3	Concept of Planning Region: Fundamental considerations - Objective - availability of data - administrative viability. Delimitation of Economic Regions: rational - approaches to regional economic development: Classical - economic - sociological - holistic approach.	
UNIT 4	Information Systems for Regional Development: Systems approach - Task and elements of information system - information required - sources of information - planning for information systems.	
UNIT 5	The Process of Regional Planning: identifying the regionalism present - demarcating the region - determining the needs of the region - making a plan for the region - implementing the plan within the framework of the state and federal sovereignties - review of the plan as it goes into effect.	

Text Books

1. Misra R.P., Regional Planning in India, Concept Publishing House, New Delhi, 1992

Reference Books

1. Bhat.L.S.et.al: Micro Level Planning - A Case Study of Karnal Area, Haryana - India, K.B. Publications, New Delhi, 1976.
2. Misra.R.P.(Ed): Local Level Planning and Development, Sterling Publishers Pvt.Ltd., New Delhi,1983.
3. Munirathna Naidu.K: Area Planning for Regional development, Inter - India Publications, New Delhi, 1984.
4. Prodipto Roy & Patil, B.R., "Manual for Block Level Planning", Mac.Millan Company of India Ltd., Delhi, 1977.

15GEOP03E5	Major Elective Courses Web Technology for Geoinformatics	4 Credits
Objective: <i>To make the students to get basic knowledge about the Internet & Web Technology</i>		
Specific Objectives of Learning:		
<ol style="list-style-type: none"> 1. To learn the basics about internet 2. To gain basic knowledge in HTML, XML, DHTML, GHTML, Javascript & VBScript 3. To introduce the concept of WebGIS and Open GIS. 		
UNIT 1	Internet - network information system and W3C - IP addresses and routing - core web technologies: server side, client side-Protocols-API	
UNIT 2	Markup Languages- XML – HTML – DHTML – GHTML - Style sheet technologies – creating dynamic web pages	
UNIT 3	Scripting languages: introduction- Java script, VB script, ASP – Java Script - functions, objectives, and control structures - simple programmes	
UNIT 4	Web GIS: basics and services - components of Web GIS - concept of maps and software repository - scripts and data management system uses and limitation.	
UNIT 5	Web GIS technology -browser for web GIS- -the need for map server and database engine - VRML-inter operability - portable and dynamic web pages - Net and .com methodologies in web GIS - open GIS.	

Text Books

1. Andrew Ford and Tim Dixon, Spinning the Web, 2/e. International Thomson Computer press, 1996.
2. Thomas A. Powell, The Complete Reference - Web Design, Tata Mc Graw - Hill Publishing Company, New Delhi, 2003.

Reference Books

1. H.M. Deitel Nieto et al. Internet and World Wide Web - How to program, Second Edition, Prentice Hall of India, New Delhi, 2003.
2. Jose A. Ramalho, Advanced HTML 4.0 with DHTML, BPB Publications, New Delhi, 2000

15EXNP03N2	Compulsory Non Credit Courses Extension / Field Visit
<ul style="list-style-type: none"> ▪ Identification of a problem in consultation with internal guide ▪ Executing the work as per the instructions of both internal and external guide while incorporating any of the following activities or combination of activities <ul style="list-style-type: none"> ▪ Designing of Geoinformatics ▪ GIS implementation and application ▪ Map server design ▪ RS application ▪ GPS application ▪ Spatial modeling or such other related topics, which will give focus to Geoinformatics implementation ▪ The size of the dissertation may be between 50 and 70 pages, which is not inclusive of scripts and other appendices ▪ The dissertation should be submitted both in print form and digital form (pdf / crystal reports). 	

15GEOP00MX	Modular Courses Spatial Decision Support System	2 Credits
Objective: <i>To expose the students about decision making and them to construct spatial decision support system</i>		
Specific Objectives of Learning: 1. To introduce concepts, Architecture and frame work in Decision Making 2. To understand the Concepts of Decision variables 3. To learn about various ranking,rating and comparision methods involved in SDSS 4. To learn about various modelling techniques 5. To Discuss about role of SDSS in various applications		
UNIT 1	Introduction to Information and Decision Making - Concepts and Characteristics of Decision Support Systems (DSS) – Architecture of DSS - Framework for Spatial Decision modelling - Spatial Decision Support Systems (SDSS) and GIS	
UNIT 2	Concepts of Decision variables – Deterministic, Random, Linguistic - Decision Alternatives and Constraints - Efficiency and Effectiveness of Decision Making – DSS and Expert Systems	
UNIT 3	Concepts of Estimating Weights – Ranking Methods – Rating Methods – Pairwise comparison methods – Trade off analysis methods – their comparisons – Decision Rules.	
UNIT 4	Concepts and types of Multi-attribute Decision modelling – Multi objective Decision Modelling – Sensitivity Analysis – Maps as Decision tools.	
UNIT 5	Land Suitability Analysis – Education and Health Care Resources Allocation – Industry and Business - Water Resources Management – Site Selection – Biodiversity	

Reference Books

1. Bonczek, R.H., C.W. Holsapple, and A.B. Whinston, 1981, Foundations of Decision Support Systems, Academic Press, New York.
2. House, W.C. (ed.), 1983. Decision Support Systems, Petrocelli, New York.
3. Jenson, J.R. 2000, Remote Sensing of the environment – An Earth Resource Perspective, Prentice Hall Inc.
4. Malczewski, J. 1999, GIS and Multicriteria Decision Analysis, John Willey and Sons, New York.
5. Raghu Ramakrishnan, 2002, Database Management Systems, Johannes Gehrke, McGraw- Hill.
6. Roy, P.S. 2000, Natural Disaster and their mitigation. Published by Indian Institute of Remote Sensing (IIRS).
7. Schultz, G. A. and Engman, E. T., 2000, Remote Sensing in Hydrology and Water Management, Springer-Verlag, Berlin, Germany.
8. Spatial Technologies for Natural Hazard Management. Proceedings of ISRS National Symposium, Nov. 21-22, 2000, IIT, Kharagpur.
9. Sprague, R.H., 1980, A framework for the development of decision support systems Management Information Sciences, Quarterly 4:1-26.
10. Sprague, R.H., and Carlson, E.D., 1982, Source for DSS development model, Building Effective Decision Support Systems, Prentice-Hall, Englewood Cliffs NJ

15GEOP00MY	<u>Modular Courses</u> Introduction to Rural Development	2 Credits
Objective: <i>This course introduces principle and concepts of Remote Sensing and GIS, its applications for geology, natural hazards and environmental management.</i>		
<u>Specific Objectives of Learning:</u> On completion of this course, student will be able to recognize geological features using image characteristics and will be able to perform image processing and can interpret satellite images for possible earth resources.		
Unit 1	Rural Development: Concept - Facets-Major issues	
Unit 2	Theoretical Framework for rural development - Assets distribution- land ownership methods of production - -resource distribution- social framework of agriculture	
Unit 3	Rural Development Programmes of Government of India - Past and Present programmes - Impact of rural development programmes	
Unit 4	Stakeholders in rural development: State and Bureaucracy in rural development - Panchayati Raj Institutions (PRIs) - NGOs. People's Participation - Myths and reality	
Unit 5	Sustainable Rural Development - Gandhian Economic Order - Dr.J.C.Kumarappa's - Theory of Economic Permanence	

Reference Books

1. Jai Narain Sharma: Alternative Economics- Economics of Mahatma Gandhi & Globalization, Deep & Deep Publications (P) Ltd., New Delhi, 2003.
2. John M. Riley: Stakeholders in Rural Development, Sage Publications, New Delhi, 2002.
3. Sartaj Aziz: Rural Development- Learning from China, Macmillan Press, 1978.
4. Jan Nederveen Pieterse: Development Theory- Deconstructions/Reconstructions, Vistaar Publications, New Delhi, 2001.
5. Sugata Dasgupta: Towards a post Development Era-Essays in Poverty, Welfare and Development, Mittal Publications, Delhi, 1985.
6. Sudhakar . V: New Panchayati Raj System, Mangal Deep Publications, Jaipur, 2002.
7. Ratnakar Gedam : Poverty in Indian, Deep & Deep Publications, New Delhi, 1998.
8. Madan. G.R. : Indian Rural Problems, Radha Publications, New Delhi, 2002.
9. Human Development in South Asia - Agriculture and Rural Development, Mahabubul Hag Human Development Centre, Oxford University Press, New York, New Delhi, 2002.
10. Choudhry R.C. & Rajakutty.S : Fifty Years of Rural Development, NIRD, Hyderabad, 1998.
11. Katar Singh: Rural Development - Principles, Policies and Management, Sage Publications, New Delhi, 1986.
12. Maheswari. S : Rural Development in India - A Public Policy Approach, Sage Publications, New Delhi, 1985.
13. Sundaram .K.V.: Decentralized Multilevel Planning - Principles and Practices, Concept Publications, New Delhi, 1997.
14. Lalitha. N. : Rural Development in India - Emerging Issues and Trends, Dominant Publishers and Distributors, New Delhi, 2004 (II volumes).

15GEOP00MY	Modular Course Open source software	4 Credits
Objective: <i>The open source options are for research and development. It helps the candidate to think creatively and independently in Geoinformatics project implementation</i>		
Specific Objectives of Learning: <ol style="list-style-type: none"> 1. Concepts and protocols used in Open Source GIS 2. Introduction to Open source tool kit, Openjump, GRASS, ILWIS, Openstreet map, QGIS, SagaGIS 3. Fundamentals applied in Open source database management 4. Functionalities of Open Source GIS software in Desktop and Web based environments 5. Complete freedom to modify the software to suit the needs availability of various Open Source GIS software and their architecture 		
UNIT 1	Introduction to Open source – Importance and Need of Open source – Advantages of Open source– Application of Open source. Open source operating systems: LINUX: Introduction – General Overview – Kernel Mode and user mode – Process – Advanced Concepts.	
UNIT 2	Open source Software- Introduction to Open source tool kit - Openjump – GRASS – ILWIS – Openstreet map - QGIS - SagaGIS - Map window-cloud GIS	
UNIT 3	Open source Database GIS and allied programming - PostGIS – Python - Java Scripting, HTML.	
UNIT 4	Web Mapping with Open source tool kit - Introduction to digital mapping – Merits and demerits of web mapping - Different kinds of web mapping – Openlayers, GeoServer – Geospatial Data Library – Open source tool kits. Project on Webmapping: A Panchayath GIS will be created by different groups.	
UNIT 5	GIS CUSTOMISATION PROGRAMMING: GIS Customisation - Needs – Scripting Language – Advantage of Macro Scripting – Sample Case studies.	

Reference Books

1. Markus Neteler, Helena Mitsova, Open Source GIS: A GRASS GIS Approach, Edition, Springer 2007
2. Neteler, M and H.Mitsova, Open Source GIS. A GRASS GIS Approach, Kluwer Academic Publishers, Bostan, USA/London, UK, 2008.
3. Qgis: <https://www.packtpub.com/application-development/mastering-qgis>

M.Sc. Geoinformatics

(To be offered from the Academic year 2015 - 16 under the CBCS)

S E M E S T E R - 4

S e c o n d Y e a r

CENTRE FOR GEOINFORMATICS

The Gandhigram Rural Institute - Deemed University, Gandhigram - 624302

SEMESTER IV

15GEOP0417 **Core Course** **6**
Dissertation **Credits**

- Identification of a problem in consultation with internal guide
- Executing the work as per the instructions of both internal and external guide while incorporating any of the following activities or combination of activities
 - Designing of Geoinformatics
 - GIS implementation and application
 - Map server design
 - RS application
 - GPS application
 - Spatial modeling or such other related topics, which will give focus to Geoinformatics implementation
- The size of the dissertation may be between 50 and 70 pages, which is not inclusive of scripts and other appendices
- The dissertation should be submitted both in print form and digital form (pdf / crystal reports).

15GEOP0418 **Core Course** **12**
Internship **Credits**

1. It demands submission of fortnight reports on learning process and execution of desired objectives.
2. The internship is evaluated internally by the content the reports and viva voce

**INTERDEPARTMENTAL – OTHER DEPARTMENTS
NON-MAJOR ELECTIVE PAPERS
FOR UG / PG PROGRAMMES**

15GEOU04N1	<u>Non-Major Elective</u> Introduction to Geoinformatics	3 Credits
Objective: <i>To understand the technologies of Geoinformatics and its applications</i>		
Specific Objectives of Learning: 6. To introduce the technologies of Geoinformatics 7. To explain the concept of Remote Sensing and Digital Image Processing 8. To learn the concept of Geographical Information System 9. To know Global Navigation Satellite System 10. To understand the application of Geoinformatics		
UNIT 1 Introduction	Meaning - Concept of Spatial Dimension – Contributing Technologies – Earth – Shape - Spatial objects	
UNIT 2 Remote Sensing & DIP	Definition – Components – EMR - Remote Sensing Resolutions - Aerial - Satellite Remote Sensing. Digital Image Processing: Definition - Stages in DIP – Image Classification	
UNIT 3 Geographical Information System	Introduction – Definition - Components of GIS – Geodatabase - Analytical Tools of GIS.	
UNIT 4 Global Navigational Satellite System	Definition – History - Working Principles – Segments – Global – NAVSTAR, GLONASS, GALILEO; Regional – IRNSS, BEIDOU; Augmentation – WAAS, LAAS.	
UNIT 5 Application of Geoinformatics	Natural Resources and Disasters Mapping and Management –Environmental Studies – Urban Studies – Military – Civil Engineering – Agriculture - Navigation - Location Based Services - Facilities Management.	

Text Book

2. LO. C.P., and Albert K.W.Yeung, Concepts and Techniques of Geographic Information Systems, Prentice-Hall of India, New Delhi, 2006.

Reference Books

6. Peter A. Burrough and Rachael A. Mc. Donnell, Principles of Geographical Information System, Oxford University Press Inc., New York, 2004.
7. Ian Heywood, Sarah Cornelivs and Steve Carver, An Introduction to Geographical Information System, Pearson Education Pvt .Ltd., New Delhi, 2007.
8. Arthur H. Robinson et al. Elements of Cartography, V Edition, John Wiley & Sons, New Delhi, 2002.
9. Lillesand M. Thomas and Ralph W.Kiefer, Remote Sensing and Image Interpretation, John Wiley & Sons, New York, 2007.
10. Satheesh Gobi, Global Positioning System – Principles and Applications, Tata McGraw – Hill Publishing Co Ltd, New Delhi, 2005.

15GEOP02N1	<u>Non-Major Elective</u> Basics of Geoinformatics	4 Credits
Objective: <i>To understand the technologies of Geoinformatics and its applications</i>		
Specific Objectives of Learning: <ol style="list-style-type: none"> 1. To introduce the technologies of Geoinformatics 2. To explain the concept of Remote Sensing and Digital Image Processing 3. To understand the concept of Geographical Information System 4. To learn about Global Navigation Satellite System at various levels and modes of surveying 5. To apply Geoinformatics in various fields. 		
UNIT 1 Introduction	Meaning – Scope - Concept of Spatial Technologies -Contributing Technologies – Earth - Projection – Representation of Spatial objects.	
UNIT 2 Remote Sensing & DIP	Definition – Components – EMR - Remote Sensing Resolutions - Aerial Remote Sensing - Satellite Remote Sensing - Types of Satellites – Satellite Photogrammetry - Image Interpretation - Digital Image Processing: Definition, Stages in Image Processing – Image Classification.	
UNIT 3 Geographical Information System	Introduction – Definition - Components of GIS – types of data – sources of spatial/attribute data - Geodatabase - Analytical Tools of GIS (Measurement, buffer, overlay, query, spatial interpolation, surface analysis, and network analysis).	
UNIT 4 Global Navigational Satellite System	Definition-History - Working Principles – Segments - Advantages – Disadvantages of GNSS - NAVSTAR, GLONASS, GALILEO; Regional – IRNSS, BEIDOU; Augmentation – WAAS, LAAS - Stand alone/DGPS - Modes of GPS Surveying.	
UNIT 5 Application of Geoinformatics	Natural Resources Management - Environmental Studies - Disaster Management - Utilities Management - Land Parcel Based - Urban Studies - Military Applications – Navigation - Location Based Services – Civil Engineering - Agriculture.	

Text Book

2. Lillesand M.Thomas and Ralph W.Kiefer, Remote Sensing and Image Interpretation, John Wiley & Sons, New York, 2007.

Reference Books

1. Peter A. Burrough and Rachael A. Mc. Donnell, Principles of Geographical Information System, Oxford University Press Inc., New York, 2004.
2. Ian Heywood, Sarah Cornelivs and Steve Carver, An Introduction to Geographical Information System, Pearson Education Pvt .Ltd., New Delhi, 2007.
3. Arthur H. Robinson et al. Elements of Cartography, V Edition, John Wiley & Sons, New Delhi, 2002.
4. Lillesand M. Thomas and Ralph W.Kiefer, Remote Sensing and Image Interpretation, John Wiley & Sons, New York, 2007.
5. Sathesh Gobi, Global Positioning System – Principles and Applications, Tata McGraw – Hill Publishing Co Ltd, New Delhi, 2005.
6. Paul R. Wolf, Elements of Photogrammetry, Mc Graw – Hill Science, 2001.

15GEOP02A1	FUNDAMENTALS OF GIS	Credits: 4
OBJECTIVES: <ul style="list-style-type: none"> To introduce the fundamentals, concepts spatial and non-spatial structure in Geographical Information System and make them familiar in handling and managing GIS database 		
LEARNING OUTCOMES <ul style="list-style-type: none"> Understand basic concepts and components of GIS. Ability to design Spatial and non-spatial data structure. Acquire skills create and manage spatial data in GIS. 		
UNIT	CONTENTS	
I	Geographical Information System	
	Geographical Information System: Definition - maps and spatial information - computer assisted mapping and map analysis -	
	<ul style="list-style-type: none"> Components of GIS 	
	<ul style="list-style-type: none"> People and GIS 	
	<ul style="list-style-type: none"> Thematic characteristics of spatial data Other sources of spatial data: census, survey, air photos, satellite images and field data. 	
II	Spatial and Non Spatial Data Modeling	
	<ul style="list-style-type: none"> Spatial and non spatial data modeling: Spatial entities - Raster and Vector data structures - comparison of vector and raster methods 	
	<ul style="list-style-type: none"> Raster and vector approach to digital terrain modeling 	
	<ul style="list-style-type: none"> Modeling network 	
	<ul style="list-style-type: none"> Layered approach and object oriented approach 	
	<ul style="list-style-type: none"> Modeling third and fourth dimensions 	
	<ul style="list-style-type: none"> Problems of data management 	
	<ul style="list-style-type: none"> Database management system - relational database model Linking spatial and attributes data - GIS database development 	
III	Data Input and Editing	
	<ul style="list-style-type: none"> Data input and editing: - Encoding methods of data input: electronic/transfer 	
	<ul style="list-style-type: none"> Data Editing: methods of correcting errors in attribute and spatial data 	
	<ul style="list-style-type: none"> Transformation and generalization. 	
	<ul style="list-style-type: none"> Edge Matching and rubber sheeting Integrated database 	
IV	Data Analysis Operation in GIS	
	<ul style="list-style-type: none"> Data Analysis Operation in GIS: Terminologies - measurements of length, perimeter and area in GIS 	
	<ul style="list-style-type: none"> Queries - reclassification - buffering and neighbourhood functions 	
	<ul style="list-style-type: none"> Integrated Data 	
	<ul style="list-style-type: none"> Raster and Vector Overlay Method: Point-in-polygon, Line-in-Polygon, Polygon-on-Polygon- problems of Raster and Vector overlays Spatial interpolation – GIS for surface analysis - Network analysis: Shortest path problem – Route Tracing. 	

V	OUTPUT
	<ul style="list-style-type: none"> • Maps as output
	<ul style="list-style-type: none"> • Alternative cartographic outputs
	<ul style="list-style-type: none"> • Non-Cartographic outputs-Spatial multimedia
	<ul style="list-style-type: none"> • Delivery mechanism
	<ul style="list-style-type: none"> • GIS and spatial decision supports
	Total Contact Hours
<p><i>Text Books:</i></p> <p>1. An Introduction to Geographical Information System, Ian Heywood, Sarah Cornelivs and Steve Carver, Pearson Education Pvt .Ltd., New Delhi, 2007.</p> <p>References:</p> <p>1. Principles of Geographical Information Systems, Peter A. Burrough and Rachael A. McDonnell, Oxford University Press Inc., New York, 2004.</p> <p>2. M. Anji Reddy, Geoinformatics for Environmental Management, BS Publications, Hyderabad, 2004.</p> <p>3. Geographic Information Systems, Routledge, David Martin, London, 2002.</p> <p>4. Introduction to Geographic Information systems, Kang-tsung chang, Tata McGraw – Hill Publishing Company Limited,New Delhi,2006.</p> <p>5. Concepts and Techniques of Geographic Information Systems, C.P.LO, Albert K.W.Yeung, Prentice-Hall of India, New Delhi – 2006.</p>	