

SMT PARVATIBAI CHOWGULE COLLEGE OF ARTS AND SCIENCE
MARGAO – GOA 403601
Affiliated to Goa University
Accredited by NAAC at A Grade

POST GRADUATE DEPARTMENT OF GEOGRAPHY

POST GRADUATE DIPLOMA
In
GEOINFORMATICS

2009-2010

Onwards

The objective of this diploma course is to impart instruction and training to candidates in specialized field of techniques and resources and also intended to develop capacity building for employment, teaching and research.

SMT PARVATIBAI CHOWGULE COLLEGE OF ARTS AND SCIENCE
MARGAO – GOA 403601
Affiliated to Goa University
Accredited by NAAC at A Grade

POST GRADUATE DEPARTMENT OF GEOGRAPHY

POST GRADUATE DIPLOMA
In
GEOINFORMATICS

2009-2010

Onwards

Proposed Structure of Postgraduate Diploma in Geo-informatics

Course Code	Course Title	Marks
Semester I		Theory and Practical components 50+50
GC-101	Basics of Geo informatics	100
GC-102	Principles of Computer and Computer Programming	100
GO-101	Geostatistics	100
GO-102	Basics of Cartography & Photogrammetry	100
GO-103	Mathematical Applications in Geoinformatics	100
Semester II		
GC-201	Spatial Analysis & Modeling	100
GC-202	Advanced Remote Sensing and GIS	100
GO-201	Digital Image Processing	100
GO-202	Enterprise GIS techniques	100
GO-203	GIS for Business and Service Planning (Theory 50 + Project 50)	100
GO-204	GIS for Urban and Regional Planning (Theory 50 + Project 50)	100
GO 205	GIS for Environmental Management (Theory 50 + Project 50)	100

Note:

- 1) Duration – 1 lecture of One hour each and One practical/ Laboratory session is equivalent to one contact hour in class room.
- 2) Each paper will have four instructional contact hours consisting three theory and one practical
- 3) Total Marks: 800 (entire course is divided into 8 papers consisting 100 marks each.
- 4) GC 101, GC 102 of Semester I and GC 201 and GC 202 of Semester II are compulsory courses
- 5) GO 101, GO 102 and GO 103 of Semester I and GO 201, GO 202, GO 203, GO 204 and GO 205 of Semester II are optional courses.
- 6) Student can select any two courses from the given optional paper list for Sem. I
- 7) Student can select any one course from GO201 and GO202 of Sem. II
- 8) Student can select any one subject from GO 203, GO 204 and GO 205.
- 9) Project is the part of the optional paper GO 203, GO 204 and GO 205.

POST GRADUATE DIPLOMA
In
GEOINFORMATICS

No: **GC-101**
Course title: **Basics of Geoinformatics**
No. of lectures and practicals: 50

Course outline

The course focuses on the fundamentals of Remote Sensing, Geographical Information System, and Global Positioning System by introducing the concept, techniques, hardware and software used in collection, processing and analysis of geospatial data.

Details of course contents and allotted time

No.	Topic	Allotted time (hours)	
		L	P
1.	Introduction to Remote Sensing, definition, development and recent trends	1	
2.	Concept of black body, EMR and Sources of EMR interaction with matter, law of radiation, reflectance, transmittance and absorption, atmospheric window Spectral Signatures	2	
3.	Remote Sensing Systems, Sensors and Platforms, and applications	2	1
4.	Introduction to photo products and digital products Image quality, Resolutions	2	
5.	Elements of Image Interpretation, Interpretation of Satellite images Ground Truth Collection, Visual Interpretation, Accuracy Assessment	2	4
6.	Introduction to GIS and History and development, Components and Applications trends of GIS	2	
7.	Data type, structure, Spatial and attribute, point, line, polygon- arc, nodes, vertices, and topology. Attribute data, sources and types	2	5
8.	Data processing systems, input and output devices, editing and attributing and linking	2	3
9.	Introduction to GPS, History of Positioning System GPS System Description, Error Sources & Receiver	2	3
10.	Introduction to DGPS and Total Station, GPS Performance and Policy Applications	2	2
11.	Functionality, uses and errors rectification Mapping with GPS and TPS, data linking and transformation	2	2
12.	Introduction to open source GIS	4	5
	Total	25	25

Reference Books:

1. Bolstad, P. (2005) GIS Fundamentals: A first text on Geographic Information Systems, Second Edition. White Bear Lake, MN: Eider Press, 543 pp.
2. Burrough, P.A. and McDonnell, R.A. (1998) Principles of geographical information systems. Oxford University Press, Oxford, 327 pp.
3. Campbell, J.B. (2002). Introduction to remote sensing, 3rd ed., The Guilford Press. ISBN 1-57230-640-8.
4. Chang, K. (2007) Introduction to Geographic Information System, 4th Edition. McGraw Hill.

5. Curran Paul J Principles of Remote Sensing UK: ELBS.
6. Elangovan,K (2006) GIS: Fundamentals, Applications and Implementations. New India Publishing Agency, New Delhi"208 pp.
7. Heywood, I., Cornelius, S., and Carver, S. (2006) An Introduction to Geographical Information Systems. Prentice Hall. 3rd edition.
8. Jensen, J.R. (2000). *Remote sensing of the environment: an Earth resource perspective*. Prentice Hall. ISBN 0-13-489733-1.
9. Joseph, George Fundamentals of Remote Sensing Universities Press India
10. Lillesand, T.M.; R.W. Kiefer, and J.W. Chipman (2003). Remote sensing and image interpretation, 5th ed., Wiley. ISBN 0-471-15227-7.
11. Longley, P.A., Goodchild, M.F., Maguire, D.J. and Rhind, D.W. (2005) Geographic Information Systems and Science. Chichester: Wiley. 2nd edition.
12. Maguire, D.J., Goodchild M.F., Rhind D.W. (1997) Geographic Information Systems: principles, and applications. Longman Scientific and Technical, Harlow.
13. Muralikrishna V Geographical Information Systems and Remote Sensing Applications Allied Publsihers Private Limited
14. Nag P and Kudrat M Digital Remote sensing New Delhi: Concept Publishing
15. Richards, J.A.; and X. Jia (2006). Remote sensing digital image analysis: an introduction, 4th ed., Springer. ISBN 3-540-25128-6.
16. Sabins Floyd F Remote Sensing: Principles and Interpretation New York: WH Freeman and Company
17. Thurston, J., Poiker, T.K. and J. Patrick Moore. (2003) Integrated Geospatial Technologies: A Guide to GPS, GIS, and Data Logging. Hoboken, New Jersey: Wiley.
18. Wise, S. (2002) GIS Basics. London: Taylor & Francis.

POST GRADUATE DIPLOMA
In
GEOINFORMATICS

Course No: **GC-102**
Course title: **Principles of computers and computer programming**
No. of lectures and practicals:50

Course outline

The course will explore the fundamentals of computer science, RDBMS and programming for GIS customization. It include: introduction to computers; R/DBMS; programming languages etc.

Details of course contents and allotted time

No.	Topic	Allotted time (hours)	
		L	P
1	Introduction to Computers, Hardware and Software, System requirement, configuration and operating systems and Computer Applications	2	
2	Introduction to Algorithms and Programming in Computers	2	2
3	Introduction to Data Base Management System, (DBMS) and Resource Data Base Management System (RDBMS)	4	4
4	Introduction to MS ACCESS and applications	2	3
5	Introduction to simple programming in C	5	6
6	Developing programming techniques and solutions for spatial algorithms and problem-solving using VB	3	6
7	Getting started with HTML, flash	4	2
8	Introduction to Python	3	2
	Total	25	25

Reference Books:

1. Benjamin C. Pierce (2002). Types and Programming Languages, The MIT Press.
2. Bruce J. MacLennan (1999). Principles of Programming Languages: Design, Evaluation, and Implementation, Oxford University Press.
3. Daniel P. Friedman and Mitchell Wand (2001). Christopher Thomas Haynes: Essentials of Programming Languages, The MIT Press.
4. David Gelernter and Suresh Jagannathan (1990). Programming Linguistics, The MIT Press.
5. Goldschlager, L. (1998). A Lister Computer Science - a modern Introduction Prentice Hall, 1988.
6. John C. Mitchell (2002). Concepts in Programming Languages, Cambridge University Press.
7. Michael L. Scott (2005). Programming Language Pragmatics, Morgan Kaufmann Publishers.
8. Ravi Sethi (1996). Programming Languages: Concepts and Constructs, 2nd ed., Addison-Wesley.

POST GRADUATE DIPLOMA
In
GEOINFORMATICS

Course Code **GO 101**
Course title: **Geostatistics**
No. of lectures and practicals: 50

Course outline

The course is designed to develop the skills required to understand, organize, interpolate, analyze and interpret the geospatial information and to develop the firm foundation to apply it in various fields.

Details of course contents and allotted time

No.	Topic	Allotted time (hours)	
		L	P
1	Introduction, the concept of spatially related statistics, integrated approach, advantages and disadvantages	2	
2	Data type and structure: hole, point, volume data geometry and association, 3D grid data geometry and association	3	2
3	Basic statistics: measurement and summary, distribution, covariance and correlation, transformations, data analysis, display and sampling	3	4
4	Prediction and interpolation : spatial interpolation, spatial classification, Kriging types and application, prediction and validation, normalization	2	5
5	Spatial processes: covariance, variogram and semivariogram	2	4
6	Modeling the variogram, experimental variogram and nested sampling	2	2
7	Spectral analysis: linear sequences, Gilgai transect, power spectra and Caragabal transect (bandwidth and confidence interval)	4	3
8	Geostatistical uncertainty, probability and reliability	3	2
9	Data management for Geostatistics	2	3
10	Applications of Geostatistics	2	
	Total	25	25

Reference Books:

- 1 Simon W. Houlding, (2000) Practical Geostatistics: Modeling and Spatial Analysis, Springer, Berlin
- 2 Ricardo A. Olea (1999) Geostatistics for Engineers and Earth Scientist, Kluwer Academic Publishers, Boston
- 3 Richard Webster and Margaret A. Oliver : Geostatistics for Environmental Scientists, Statistics in Practice (2nd ed) J. Wiley
- 4 Ott, T. and Swiaczny, F. (2001). Time-integrative GIS. Management and analysis of spatio-temporal data. Berlin / Heidelberg / New York: Springer.
- 5 Thurston, J., Poiker, T.K. and J. Patrick Moore. (2003). Integrated Geospatial Technologies: A Guide to GPS, GIS, and Data Logging. Hoboken, New Jersey: Wiley.
- 6 Roy, P.S. (2006). Geoinformatics for Tropical Ecosystems Bishen Singh Mahendra Pal Singh, Dehradun

POST GRADUATE DIPLOMA
In
GEOINFORMATICS

Course No: **GO 102**
Course title: **Basics of Cartography & Photogrammetry**
No. of lectures and practicals: 50

Course outline

The course gives emphasis on the art, science, and technologies of cartography and Photogrammetry. It develops the user's ability to understand how maps are created and used to represent and communicate spatial phenomena and their relationships through photogrammetric perspective.

Details of course contents and allotted time

No.	Topic	Allotted time (hours)	
		L	P
1.	Introduction to Cartography, Basics of Map, Fundamentals of direction, scale, types, sources	2	3
2.	Elementary geodesy: Coordinate systems and transformations. Spheroid and Geoid. Geocentric Datum, datum and map projections. 3D coordinates transformations.	3	3
3.	Thematic Cartography Characteristics of geographical phenomena – Symbolizing spatial data, Visual Graphics, Cartograms and maps.	3	4
4.	Principles of colour perception, models and methods. Colour scheme for Univariate choropleth and Isarithmic maps, proportional symbol mapping	3	4
5.	Interpolation methods for smooth continuous phenomena symbolizing smooth continuous phenomena. Dot and asymmetric mapping.	2	3
6.	Introduction to Photogrammetry, History of Aerial Photographs	2	2
7.	Aerial Cameras and Photographs, Geometry of Aerial Photograph, Types, acquisition, scanning, quality	2	2
8.	Planning Aerial Photography and elements of aerial photograph measurement and calculation of scale, coverage, area, and parallax	3	2
9.	Stereoscopic photographs and Parallax, parallax measurement	3	2
10.	Applications and limitation of Aerial Photography	2	
	Total	25	25

Reference Books:

1. ESRI. 2004. ESRI Cartography: Capabilities and Trends. Redlands, CA. White Paper
2. Imus, D. and Dunlavey, P. 2002. Back to the Drawing Board: Cartography vs the Digital Workflow. MT. Hood, Oregon.
3. Kraak, Menno-Jan and Allan Brown (2001): Web Cartography – Developments and prospects, Taylor & Francis, New York, ISBN 0-7484-0869-X.

4. MacEachren, A.M. (1994). *Some Truth with Maps: A Primer on Symbolization & Design*. University Park: The Pennsylvania State University. ISBN.
5. Monmonier, Mark (1991). *How to Lie with Maps*. Chicago: University of Chicago Press. ISBN 0-226-53421-9.
6. Monmonier, Mark (1993). *Mapping It Out*. Chicago: University of Chicago Press. ISBN.
7. Pickles, John (2003). *A History of Spaces: Cartographic Reason, Mapping, and the Geo-Coded World*. Taylor & Francis. ISBN 0-415-14497-3.
8. Sircar, D.C.C. (January 1990). *Studies in the Geography of Ancient and Medieval India*. Motilal Banarsidass Publishers. ISBN 8120806905.
9. Slocum, T. (2003). *Thematic Cartography and Geographic Visualization*. Upper Saddle River, New Jersey: Prentice Hall. ISBN 0-130-35123-7.
10. Wilford, John Noble (2000). *The Mapmakers*. Vintage Books. ISBN 0-375-70850-2.
10. Terry A. Slocum (1999): *Thematic Cartography and Visualization*, Prentice Hall, New Jersey
11. MJ Kraak, F Ormeling - 2003 - *Cartography: visualization of geospatial data* Addison-Wesley Longman Ltd
12. Burnside, C. D. (1985). *Mapping from Aerial Photography*. 2nd Ed, Collins.
13. Campbell, J.B. (2002). *Introduction to remote sensing*, 3rd ed., The Guilford Press. ISBN 1-57230-640-8.
14. Curran Paul, J. (1984) *Principles of Remote Sensing* UK: ELBS.
15. Joseph, George (2007) *Fundamentals of Remote Sensing* Universities Press India
16. Lillesand, T.M.; R.W. Kiefer, and J.W. Chipman (2007). *Remote sensing and image interpretation*, 5th ed., Wiley. ISBN 0-471-15227-7.
17. Moffitt, F. H. (1980). *Photogrammetry*. 3rd Ed, Harper & Row, NY.
18. Sabins Floyd F *Remote Sensing: Principles and Interpretation* New York: WH Freeman and Company
19. Wolf, P. R. (1983). *Elements of Photogrammetry*. McGraw-Hill, NY.
20. Zorn, H. C. (1980). *Introductory Course in Photogrammetry*. 6th Ed. ITC, Netherlands.

POST GRADUATE DIPLOMA
In
GEOINFORMATICS

Course No: **GO 103**
Course title: **Mathematical Applications in Geoinformatics**
No. of lectures and practicals: 50

Course outline

The course is designed to serve as a foundation course in order to meet the requirement of mathematical knowledge in various subsequent courses offered in the master's degree program of Environmental Studies and Natural Resource Management.

Details of course content and allotted time

No.	Topic	Allotted time (hours)	
		L	P
1	Introduction Concepts and development Sets: Sets and their representation	3	2
2	Introduction to Scaling Linear, Non linear, exponential, Logarithmic Gaussian	2	3
3	Complex Numbers Representation of Complex numbers in rectangular and polar coordinates, graphical representation,	2	3
4	Quadratic Equations Solution of quadratic equations, relation between roots and coefficients,	2	2
5	Functions, Concept, Domain and Range, Types of functions and their graphs	2	2
6	Limits and Continuity, Fundamental theorem of limits and proofs of standard limits,	4	2
7	Differentiation : logarithmic, trigonometric, exponential, inverse trigonometric, implicit, Applications of derivatives,	5	3
8	Introduction to integrals Indefinite Integrals & Definite Integral	3	3
9	Applications in Geoinformatics Some case Studies	2	5
	Total	25	25

Textbooks

1. Graeme Bonham-Carter, Qiuming Cheng (2008) Progress in Geomathematics. Springer, New York
2. Parkhurst, D.F. (2006). Introduction to Applied Mathematics for Environmental Science. Springer, USA.
3. Piskunov, N. (1965). Differential and Integral Calculus. Routledge, UK.
4. Prasad, G. (2004). Differential Calculus. Pothishala Pvt. Ltd., Allahabad.
5. Prasad, G. (2004). Integral Calculus. Pothishala Pvt. Ltd., Allahabad.

POST GRADUATE DIPLOMA
In
GEOINFORMATICS

Course No: **GC-201**
Course title: **Spatial Analysis & Modeling**
No. of lectures and practicals: **50**

Course outline

The course covers fundamental aspects of spatial data modeling specifically on the aspect of three-dimensional (3D) modeling, structuring, raster and vector analysis etc. It also looks into integration of non-spatial data and its application.

Details of course contents and allotted time

No.	Topic	Allotted time (hours)	
		L	P
1.	Introduction to spatial analysis and interpolation. Statistical and Graphical foundation, data classification	4	4
2.	Fundamentals of Geospatial modeling: data, models, components, phases, conceptual designs, logical design, The spatial modeling process. Map algebra, fuzzy logic method and conditional probability.	3	2
3.	Introduction, concept overview, development and applications 2D and 3D spatial data representation (Visual, exploratory and confirmatory analysis and related issues).	3	3
4.	Models of spatial and relational databases	2	4
5.	Spatial data access, indexing and SQL	3	4
6.	Spatial interpolation techniques and data analysis	3	3
7.	Spatial Models (Binary, index, regression, process etc.), Topographic Analysis (DEM, STM, DSM, Slope, Aspect etc.)	3	3
8.	Spatial Decision Support System decision making - multi-attribute and multi-objective. Factors, constraints, criterion maps and weights	4	2
	Total	25	25

Reference Books:

1. Alias A. Rahman and Morakot Pilouk (2008) Spatial Data Modeling for 3D GIS, Springer New York
2. Longley, P.A., Goodchild, M.F., Maguire, D.J. and Rhind, D.W. (2005). Geographic Information Systems and Science. Chichester: Wiley. 2nd edition.
3. Ott, T. and Swiaczny, F. (2001). Time-integrative GIS. Management and analysis of spatio-temporal data. Berlin / Heidelberg / New York: Springer.
4. Thurston, J., Poiker, T.K. and J. Patrick Moore. (2003). Integrated Geospatial Technologies: A Guide to GPS, GIS, and Data Logging. Hoboken, New Jersey: Wiley.
5. M Goodrich (2000). Data Structures and Algorithms in Java, 2nd Edition Wiley.
6. Malczewski, J. (1999). GIS and Multicriteria Decision Analysis. New York: John Wiley and Sons

POST GRADUATE DIPLOMA
In
GEOINFORMATICS

Course Code: **GC 202**
Course title: **Advanced Remote Sensing and GIS**
No. of lectures and practicals: 50

Course outline

The course will provide latest state of art in remote sensing and GIS technology. It will provide an opportunity to understand and work with latest developments remote sensing data base and GIS technology.

Details of course contents and allotted time

No.	Topic	Allotted time (hours)	
		L	P
1	Microwave Remote Sensing (SAR, SLAR, Radar, INSAR, SRTM and interpretations & applications)	3	4
2	Thermal Remote Sensing: Interpretation and Applications	2	2
3	LiDAR: introduction and applications	1	2
4	Hyperspectral Remote Sensing: interpretation, processing and classification	3	2
5	ISRO/ESO Missions	1	
6	Soft classification techniques and applications	1	2
7	Current Trends and advancement in GIS	1	
8	Participatory GIS and Mobile GIS	1	4
10	WebGIS (ArcIMS, MapServer, Geomedia, MapGuide	3	3
12	GIS servers, Intermediate softwares and Distributed GIS systems	2	2
13	Applications	2	
	Total	25	25

Reference Books:

1. Asrar Ghassem (2004) Theory and applications of optical remote sensing New York: John Wiley and Sons
2. Berry, J.K. (1993) Beyond Mapping: Concepts, Algorithms and Issues in GIS. Fort Collins, CO: GIS World Books.
3. Lillesand, T.M.; R.W. Kiefer, and J.W. Chipman (2003). Remote sensing and image interpretation, 5th ed., Wiley. ISBN 0-471-15227-7.
4. Malczewski, J. (1999). GIS and Multicriteria Decision Analysis. New York: John Wiley and Sons

5. Mitchel, Tyler (2005): *WebMapping Illustrated*, O'Reilly, Sebastopol, 350 pages, ISBN 0-569-00865-1. This book discusses various Open Source WebMapping projects and provides hints and tricks as well as examples.
6. Ott, T. and Swiaczny, F. (2001) *Time-integrative GIS. Management and analysis of spatio-temporal data*, Berlin / Heidelberg / New York: Springer.
7. Peterson, Michael P. (ed.) (2003): *Maps and the Internet*, Elsevier, ISBN 0-08-044201-3.
8. Skolnik, Merrill I. (2001). *Introduction to Radar Systems*, McGraw-Hill (1st ed., 1962; 2nd ed., 1980; 3rd ed.), ISBN 0-07-066572-9.
9. Thurston, J., Poiker, T.K. and J. Patrick Moore. (2003) *Integrated Geospatial Technologies: A Guide to GPS, GIS, and Data Logging*. Hoboken, New Jersey: Wiley.
10. Worboys, Michael, and Matt Duckham. (2004) *GIS: a computing perspective*. Boca Raton: CRC Press.

POST GRADUATE DIPLOMA
In
GEOINFORMATICS

Course No: **GO-201**
Course title: **Digital Image Processing**
(Theory 50 + Practical 50)
No. of lectures and practicals: 50

Course outline

This course will introduce fundamental technologies of digital image processing i.e. compression, information extraction and analysis. Students will also gain understanding of algorithm, analytical tools, and practical implementations of various digital image applications.

Details of course contents and allotted time

No.	Topic	Allotted time (hours)	
		L	P
1.	Introduction to Digital Image Processing & Information Extraction Visual perception, Image sensing and acquisition,	2	
2.	Digital Data Formats Image sampling and Quantization. Basic relationship between pixels – linear and non-linear operations, Image statistics display and pre-processing	3	3
3.	Development, scope and fundamental steps involved in Digital Image Processing, components of Image Processing	2	1
4.	Image Rectification Radiometric and Atmospheric Correction	3	1
5.	Geometric Correction, Ortho-rectification, calibration and rectification of photo and images,	3	5
6.	Image enhancement in spatial domain and frequency domain, Filtering, Fourier Transform, Noise removal	2	5
7.	Multispectral Image Processing: Colour Image processing, slicing, Image compression, dilation, Segmentation, Spectral rationing, density slicing and image fusion	5	5
8.	Object recognition, classification, object recognition, feature extraction, accuracy, assessment, change detection Accuracy Assessment and integration with GIS	5	5
	Total	25	25

Reference Books:

1. Burger, Wilhelm; Mark J. Burge (2007). Digital Image Processing: An Algorithmic Approach Using Java. Springer. ISBN 1846283795.
2. Campbell, J.B. (2002). Introduction to remote sensing, 3rd ed., The Guilford Press. ISBN 1-57230-640-8.
3. Damen MCJ, Sicco Smith G and Kerstappen(Ed) (). Remote Sensing for Resources Development and Environmental Management 3rd.volume Set Netherlands: Balkema

4. Gonzalez, Rafael C.; Richard E. Woods (1992). Digital Image Processing. ISBN 0-201-50803-6.
5. Jensen John R (2007). Introductory Digital Image processing: Remote Sensing Perspective New Jersey: Prentice Hall
6. Joseph, George (2007). Fundamentals of Remote Sensing Universities Press India
7. Lillesand, T.M.; R.W. Kiefer, and J.W. Chipman (2007). Remote sensing and image interpretation, 5th ed., Wiley. ISBN 0-471-15227-7.
8. Pratt, William K. (1978). Digital Image Processing. ISBN 0-471-01888-0.
9. Romeny, Bart M. (2003). Front-End Vision and Multi-Scale Image Analysis. ISBN1-4020-1507-0.
10. Umbaugh, Scott E (2005). Computer Imaging: Digital Image Analysis and Processing. ISBN 0-84-932919-1.

POST GRADUATE DIPLOMA
In
GEOINFORMATICS

Course Code: **GO-202**
 Course title: **Enterprise GIS Techniques**
 (Theory 50 + Practical 50)
 No. of lectures and practicals: 50

Course outline

The course is designed to develop the enterprise skill required in recent GIS trend including MapObjects and ArcObjects.

Details of course contents and allotted time

No.	Topic	Allotted time (hours)	
		L	P
1.	Introduction to MapObjects	1	3
2.	Introduction to VBA and Visual studio 200#	2	2
3.	Getting Started with ArcObjects	1	2
4.	Visual Basic code: How, where, and when?	2	2
5.	Using variables, Programming with class	2	2
6.	COM,OMD, Maps and layers, Data access and creation	2	2
7.	Geometry and Geoprocessing	3	2
8.	Working with subsets and selections	3	2
9.	Symbolizing elements and layers	3	2
10.	Working with layout elements, Data management	3	2
11.	ArcObjects beyond VBA	3	2
	Total	25	25

Reference Book

1. Kang-Tsung Chang, Programming ArcObjects with VBA: a task-oriented approach, 2, illustrated, CRC Press, 2007, ISBN 0849392837, 9780849392832
2. Robert Burke (2003) ,Getting to know ArcObjects, programming ArcGIS with VBA, Esri Pr,ISBN-10: 158948018X,ISBN-13: 9781589480186
3. Rick Leinecker, Vanessa L. Williams,Visual Studio 2008 All-In-One Desk ,For Dummies 2008, ISBN0 470191082, 9780470191088
4. Bruce Ralston,Developing GIS Solutions With MapObjects and Visual Basic, OnWord Press; 1 edition (October 31, 2001), ISBN-10: 0766854388 ,ISBN-13: 978-0766854383

POST GRADUATE DIPLOMA
In
GEOINFORMATICS

Course Code: **GO-203**
 Course title: **GIS for Business and Service Planning**
 (Theory 50 + Project 50)
 No. of lectures and practicals: 50

Course outline

The course is designed to develop the skills required to develop the data base for business and service planning. It also highlights the various applications of Geoinformatics in business decision making process.

Details of course contents and allotted time

No.	Topic	Allotted time (hours)	
		L	P
1	Geography ad business link , GIS for Business Services, Planning and management, Developments and prospects Micro and macro economics Organizational structures,	2	
2	Geodemographics: Population data sources, availability, measurement and modeling. and their geographical integration	2	
3	Human resources management	1	
4	Geodemographics and lifestyle approaches, Geolifestyles	3	
5	Marketing spatial analysis, spatial decision support systems 'business geographics'	3	5
6	Business censuses and the modeling of customer targeting,	2	5
7	Manipulation and merging business application databases	2	
8	Customized versus proprietary solutions to business application	2	5
9	Databases consultancy applications of GIS, Enterprise resource planning	2	5
10	Internet platform for GIS Customer facing GIS : web , eCommerce and mobile solutions, Online mapping	2	3
11	Applications Supporting business decision, Enterprise applications, Customized spatial decision support systems	2	2
12	Ethical Legal and Security issues of spatial technology	2	
	Total	25	25

Reference Book

1. Berry J.L. Geography of Market Centers and Retail Distribution, Prentice Hall, New York, 1967.
2. David Boyles (2002): GIS Means Business, Vol. 2 , ESRI Press.

3. David Unwin, *Introductory Spatial Analysis*, Methuen, London, 1981.
4. Gregory, S. *Statistical Methods and the Geographer*, Longman, London, 1978.
5. James B. Pick (2008) *Geo-Business in the Digital Organization*, John Wiley and Sons, New York
6. Koutsoyiannis: *Theory of Econometrics*, Macmillan, London, 1973.
7. Losch, A.: *The Economics of Location*, University Press, Yale, New Haven, 1954.
8. Maurice Yeats: *An introduction to Quantitative Analysis in Human Geography*, MacGraw Hill, New York, 1974.
9. Paul Longley and Graham Clarke (ed) (1996): *GIS for Business and Service Planning*, John Wiley and Sons, New York
10. Peter Haggett, Andrew D.Cliff & Allan Frey, (1977.) *Location Methods*, Vol.I and II, Edward Arnold, London,
11. Ravi Kalakota et al.: *Electronic Commerce: A Managers Guide* Pearsons Education 2004

POST GRADUATE DIPLOMA
In
GEOINFORMATICS

Course Code: **GO 204**
Course title: **GIS for Urban and Regional Planning**
(Theory 50 + Project 50)
No. of lectures and practicals: 50

Course outline

The course is aimed to introduce the concept of urban and regional planning and applications of GIS in it. It consists of collection, processing, analysis and development of solution fro urban and regional problems.

Details of course contents and allotted time

No.	Topic	Allotted time (hours)	
		L	P
1	Basics concepts of geotechnologies and recent developments	2	
2	Data classification methods and data exploration , Sources of Urban data, Mapping database, Attribute data and relational database management systems	3	4
3	Methods of spatial data analysis, System analysis of the urban planning process, Planning and urban design	3	4
4	Data acquisition in an urban environment, Quality control and multisource updating of urban databases, Design methodologies for information system,	3	3
5	Data visualization and mapping design, Visualization for displaying and accessing urban information	2	4
6	Groupware in urban planning, Hypermaps and web sites for urban planning	2	1
7	GIS strategic planning and public out reach Applications in profit and non profit organizations	3	4
8	Computer system for public participation, Advocacy planning and public information, Computer architecture for urban planning	2	1
9	Real time information systems for urban environment and risk monitoring	2	1
10	The spatial investigation capacities of neural networks Land use dynamics through artificial intelligence tools Multi-agent systems interactions among actors and their behaviors	2	3
11	Ethical issues in GIS and Urban planning GIS project development and institutional issues	1	
	Total	25	25

Reference Book

1. Ayşe Pamuk (2008) Mapping Global Cities, GIS Methods In Urban Analysis. ESRI Press. New York
2. Bhat, L.S. et al: Micro-Level Planning: A Case Study of Karnal Area, Haryana, K. B. Publications, New Delhi, 1976.
3. Bhat, L.S.: Regional Planning in India, Statistical Publishing Society, Calcutta, 1973.
4. Chorley, R.J. and Haggett, P. (ed): Network Analysis in Geography, Arnold, 1969.
5. Edward J Kaiser, David R. Godschalk,(1998) hypothetical City Workbook, Exercise, Spreadsheets, and GIS Data to Accompany Urban Land Use Planning (4th ed) Board of Trustees of University of Illinois, USA
6. Frederick R Steiner and Kent Butter (ed) (2007) Planning and Urban Design Standards, John Wiley and Sons New Jersey, Canada.
7. Juliana Maantay and John Ziegler () GIS for Urban Environment
8. Kuklinski, A.R. (ed.): Growth Poles and Growth Centres in Regional Planning, Mouton, The Hague. 1972.
9. Lidia Diappia (2004): Evolving Cities Geocomputation in Territorial Planning, Urban and Regional Planning and Developmental Series, Ashgate Publishing Company, USA
10. Misra, R.P.: Regional Planning: Concepts, Techniques and Policies, University of Mysore, Mysore, 1969.
11. Mitra, Asok, Mukherjee S. and Bose R. Indian Cities Abhinav Publications, New Delhi 1980.
12. Nangia, Sudesh, Delhi Metropolitan Region, K.B. Publications, New Delhi 1976.
13. Prakasa, Rao, V.L.S. Urbanisation in India; Spatial Dimensions, Concept Publishing Co., New Delhi 1983.
14. Robert Laurini (2001) Information System for Urban Planning: A Hyper Media Cooperative Approach(Geographical Information System Workshop)Taylor & Francis, London
15. Saroj K. Pal: Statistical Techniques-A basic approach to Geography, Tata Mc Graw-Hall Publishing Company Limited, New Delhi 110 002.

POST GRADUATE DIPLOMA
In
GEOINFORMATICS

Course Code: **GO-205**
 Course title: **GIS for Environmental Management**
 (Theory 50 + Project 50)
 No. of lectures and practicals: 50

Course Outline:

The course designed to understand the fundamentals of environment and the application of GIS in the monitoring, assessment and planning.

Details of course contents and allotted time

No.	Topic	Allotted time (hours)	
		L	P
1	Introduction to the Field of Natural Resources.	1	
2	Earth's natural resources and ecological systems, conservation protection and management of natural resources and environments.	2	
3	Interactions between global biogeochemical cycles and other components of the Earth	2	
4	Data collection and analysis, use quantitative models to analyze and interpret data	2	3
5	Natural Resource Planning and Management	2	
6	Coastal Management :Introduction, Coastal and Marine environment, Coastal Processes, Satellite Oceanography, Chlorophyll detection, Hazard mapping, PFZ mapping	3	4
7	The comprehensive planning process and human dimensions of resource management.	2	
8	Biological, social, and institutional dimensions of management - case studies	2	6
9	Environmental Governance	1	
10	Impact Analysis, Ecology Risk Assessment	3	6
11	Site evaluation and planning,	3	6
12	Resource Management and Environmental Law	2	
	Total	25	25

Reference Books:

1. Cracknell A P(ed) (1998) Remote Sensing in Meteorology, Oceanography and Hydrology. Chichester: Ellis Horwood Limited
2. Damen MCJ, Sicco Smith G and Kerstappen(Ed) (1997) Remote Sensing for Resources Development and Environmental Management 3rd.volume Set Netherlands: Balkema
3. Jensen, J.R. (2000). Remote sensing of the environment: an Earth resource perspective. Prentice Hall. ISBN 0-13-489733-1.
4. Kondratyev K Ya, Buznitov AA and Pokrovoky OM (2000). Global Change and Remote Sensing: John Wiley and Sons.

5. Roy, P.S. Geoinformatics for Tropical Ecosystems Bishen Singh Mahendra Pal Singh, Dehradun
6. Skidmore Andrew (1998) Environmental Modeling with GIS and Remote Sensing Taylor and Francis
7. Steven MD and Clark JA (1998). Applications of Remote Sensing in Agriculture London Butterworths.
8. Vincent RK (1998) Fundamentals of Geological and Environmental Remote Sensing New Jersey: Prentice Hall
9. P.K.Das, The Mansoons, National Book trust
10. P. Castro and M.E. Huber, Marine Biology, McGraw-Hill
11. Richard A Geyer ,Marine Environmental Pollution, , Elsevier Oceanography Series
12. V. Subramaniam ,Water: Quantity-Quality Perspective, ,Kingston Intl.