

COOCH BEHAR PANCHANAN BARMA UNIVERSITY
Syllabus for Certificate & Diploma Course in Geoinformatics
 Under National Skills Qualification Framework,
 University Grants Commission

Credit Framework and Marks Distribution of Certificate & Diploma Course in Geoinformatics

Certificate Course in Geoinformatics: 6 months (1st semester only), 30 credits, 400 marks
Diploma Course in Geoinformatics: 12 months (1st & 2nd Semester), 60 credits, 800 marks

Semester	Papers	Name of the Paper	Marks & Credits	General Education Component (GEC)	Skill Development Component (SDC)	Continuous Evaluation (CE) & Attendance	Total Marks / Credits	
1st Semester	Paper-I	Basics of Computer Application	Marks	30	60	6+4	100	
			Credits	2	5	1	8	
	Paper-II	Basics of Remote Sensing	Marks	30	60	6+4	100	
			Credits	2	5	1	8	
	Paper-III	Basics of Geographic Information System	Marks	30	60	6+4	100	
			Credits	2	5	1	8	
	Paper-IV	Project Work & Seminar	Marks	70 (Project Work) + 30 (Presentation & Viva-voce)			100	
			Credits	6 (SDC)			6	
	1st SEMSTER TOTAL			Marks	90	280	18+12	400
				Credits	6	21	3	30
2nd Semester	Paper-V	Advanced Remote Sensing	Marks	30	60	6+4	100	
			Credits	2	5	1	8	
	Paper-VI	Advanced Geographic Information System	Marks	30	60	6+4	100	
			Credits	2	5	1	8	
	Paper-VII	Global Navigation Satellite System & Drone Technology	Marks	30	60	6+4	100	
			Credits	2	5	1	8	
	Paper-VIII	Dissertation & Seminar	Marks	70 (Dissertation) + 30 (Presentation & Viva-voce)			100	
			Credits	6 (SDC)			6	
	2nd SEMSTER TOTAL			Marks	90	280	30	400
				Credits	6	21	3	30

Syllabus of Certificate Course & 1st Semester of Diploma Course

Paper	Topic
Basics of Computer Application PAPER- I	GENERAL EDUCATION COMPONENT
	<p>Computer Applications:</p> <ol style="list-style-type: none"> 1. Definition of Computer 2. Basic Operations of Computer 3. Input, Output & Storage unit (Primary, Secondary) 4. Central Processing unit 5. Computer Memory (RAM, ROM & Secondary) 6. Number system, Computer Network (LAN, WAN) 7. Computer software & Shortcut Keys 8. Advantages of Computer
	SKILL DEVELOPMENT COMPONENT
	<ol style="list-style-type: none"> 1. Introduction to Word Processor 2. Page setup, font, font style, colour 3. Header & footer, footnote 4. Inserting picture, wrapping textbox 5. Hyperlink 6. Table
	<ol style="list-style-type: none"> 7. Introduction to Spread Sheet 8. Page setup, inserting rows/columns, worksheet, chart, function 9. Formatting cell, color and calculation using functions
Basics of Remote Sensing PAPER -II	<ol style="list-style-type: none"> 10. Slide Show 11. Creating Slide Show by using Animation Technique
	GENERAL EDUCATION COMPONENT
	<ol style="list-style-type: none"> 1. Definition of Remote Sensing 2. Brief history of Remote Sensing 3. Electromagnetic Radiation (EMR) 4. Process of Remote sensing 5. Interaction of EMR with atmosphere (Types of Atmospheric Scattering, Reflection, Absorption), Energy Transmission 6. Remote Sensing platforms and sensors 7. Passive & Active Remote Sensing 8. Aerial photographs: Types, scale, resolutions & geometric properties 9. Satellite orbits, types of scanner, swath 1. Satellite Images: Concept of different bands 2. Resolution of Images: Spatial, Spectral, Radiometric and Temporal 3. Remote Sensing Data: Digital Image Data Format (BSQ, BIL, BIP)
Basics of Remote Sensing PAPER -II	SKILL DEVELOPMENT COMPONENT
	<p>Remote Sensing using Standard Open Source Software:</p> <ol style="list-style-type: none"> 1. Identification of Physical & Culture features & thematic mapping using Aerial Photograph. 2. Pre-processing of Images: Layer Stacking, Mosaicking & Subsetting, Clipping Area of Interest (AOI). 3. Digital Image processing: Geometric correction, Image enhancement 4. Band Compositions: True Colour composite (TCC), False Colour composite (FCC) 5. Connect, share & Process EO (Earth Observatory) data with ease using cloud enabled Web Platform

Basics of Geographic Information Systems PAPER –III	GENERAL EDUCATION COMPONENT
	<i>Overview of Geographic Information System:</i> <ol style="list-style-type: none"> 1. Definition of GIS 2. Brief history of GIS 3. Components of GIS 4. Functions and advantages of GIS 5. Applications of GIS
	SKILL DEVELOPMENT COMPONENT
	<i>GIS using Standard Open Source Software :</i> <ol style="list-style-type: none"> 1. Interface & Plugins concepts 2. Raster handling / processing 3. Geo-referencing (Map/Image to Image), (Ground to Image), (Google earth to Image) 4. Projection transformation
	<ol style="list-style-type: none"> 5. Digitization: Point, Line, & Polygon, Labeling & Symbology 6. Length & Area Calculation
	<ol style="list-style-type: none"> 7. Working with vector layers, vector editing, data attribution, import CSV file 8. Join external file with vector layer 9. Attribute & Spatial query 10. Preparation of LULC Map by on screen digitization
	<ol style="list-style-type: none"> 11. Layout / Map composition.
Project Work PAPER- IV	Project Work & Seminar (Skill Development Component)*

Syllabus of 2nd Semester of Diploma Course

Paper	Topic
Advanced Remote Sensing PAPER- V	GENERAL EDUCATION COMPONENT
	<ol style="list-style-type: none"> 1. Law of Radiation (Plank's law, Wein's law, Stefan Boltzmann's law), Black Body Radiation. 2. Spectral Reflectance Curves (water, vegetation, soil etc.) 3. Microwave Remote Sensing- introduction, Passive Microwave Remote Sensing, Radar Imaging 4. Hyperspectral Remote sensing 5. Sources of Remote Sensing Data and Information 6. Applications of Remote Sensing
	SKILL DEVELOPMENT COMPONENT
	<p><i>Advanced Remote Sensing using Industry Standard Image Processing Software:</i></p> <ol style="list-style-type: none"> 1. Retrieve of Remote Sensing Data from Bhuvan & USGS portal. 2. Image Processing 3. Supervised classification 4. Unsupervised classification 5. Classification and Reclassification 6. Basic Concept of AI & ML based classification 7. Accuracy Assessment 8. Band Ratioing (NDVI, NDWI, NDSI etc.) 9. Map Layout & export 10. Access Anywhere, Anytime, with a wide selection of AI/ML Models, ARD Toolkit and custom workflows to share with your community using Web Platform.
Advanced Geographic Information System PAPER- VI	GENERAL EDUCATION COMPONENT
	<p><i>Advanced Geographic Information System using Industry Standard GIS Software:</i></p> <ol style="list-style-type: none"> 1. Datum: WGS 84, Everest 2. Basic Concepts & Types of Projections 3. UTM Projection 4. Geographic Coordinate System 5. Projected Coordinate System 6. Spatial Data Model: Vector Data Model & Raster Data Model 7. DEM, Triangulated Irregular Network
	SKILL DEVELOPMENT COMPONENT
	<ol style="list-style-type: none"> 1. Geospatial Data Analysis: Relief Map, Slope, Aspect & Contour map using DEM Data. 2. Stream ordering, Watershed Delineation & Drainage Density using DEM Data 3. Interpolation: IDW 4. 3D Mapping 5. Overlay Operation- Vector data overlay, Raster based overlay techniques

Global Navigation Satellite System & Drone Technology PAPER –VII	GENERAL EDUCATION COMPONENT
	Overview of Global Navigation Satellite System (GNSS): <ol style="list-style-type: none"> 1. Concepts of GNSS 2. Geoid and ellipsoid 3. Geodetic Satellite, orbit & motion 4. Kepler’s Law 5. Different segments of GPS: Space, Control, User 6. Multi satellite Ranging 7. GPS signal Structure 8. GPS errors
	Drone / UAV Technology: <ol style="list-style-type: none"> 1. Basic Knowledge of Drone 2. DGCA Process Flow 3. NPNT Process 4. Drone Fly Operation Process 5. Concept of different types of sensor
	SKILL DEVELOPMENT COMPONENT
	Handheld GPS Receiver: <ol style="list-style-type: none"> 1. GPS data collection and mapping 2. Preparation of table of coordinates and elevation of all points collected & Compare the results on Google map. 3. Navigation with GPS and mapping.
Drone / UAV Technology: <ol style="list-style-type: none"> 1. Drone data collection for mapping and surveillance 2. Drone data processing, Automatic DSM/DTM Collection 3. Ortho-photo map creation using stereopair Drone imagery 4. Feature extraction from drone imagery 	
Dissertation & Seminar PAPER- VIII	Dissertation & Seminar (Skill Development Component)*

*** General Guide lines for Dissertation / Project Report & Seminar (Skill Development Component) :**

- 1) The topic of the dissertation will be distributed among the students based on the consensus of concerned faculty members / supervisor.
- 2) The final Project Report or dissertation will follow standard format
- 3) Every table, figure, photograph should have a caption.
- 4) The list of references (if any) should be given at the end of the report in standard format
- 5) Maximum page limit should not exceed 40 pages (Paper Size: A4).
- 6) Font of the text will be 12, spacing 1.5 with Times New Roman format.
- 7) Two hard copies of Dissertation / Project Report will be submitted within stipulated time period.
- 8) The work will be orally presented with slide show.

Selected Reference Books:

1. A Text Book on GPS Surveying (2015) by Dr. Jayanta Kumar Ghosh
2. Bhatta, B. (2008). Remote sensing and GIS. Oxford University Press, USA.
3. Campbell, J.B., 1996. Introduction to Remote Sensing, Taylor & Francis, London.
4. Chang, K. T. (2006). Introduction to geographic information systems (pp. 117-122). Boston: McGraw-Hill Higher Education
5. Claudia, K., Stefan, D., 2014. Quantitative Remote Sensing in Thermal Infrared, 11, Springer, 281p.
6. Cracknell, P. and Hayes, L. Introduction to remote sensing,
7. De-Jong, Steven, M., Van der Meer, F.D., 2004. Remote Sensing Image Analysis: Including the Spatial Domain: Including the Spatial Domain, 5, Springer, 359p.
8. Gupta, R. P., 2005. Remote Sensing Geology, Springer.
9. Hofmann-Wellenhof, B., Lichtenegger, H., & Collins, J. (2012). Global positioning system: theory and practice. Springer Science & Business Media.
10. Jensen, J. R. Introductory digital image processing a remote sensing perspective, Prentice Hall series in geographic information science.
11. Jensen, J.R., 2003. Remote Sensing of the Environment an Earth Resource Perspective, Pearson Education, Delhi.
12. Joseph, G., 2003. Fundamentals of Remote Sensing, University press.
13. Leick, A., Rapoport, L., & Tatarnikov, D. (2015). GPS satellite surveying. John Wiley & Sons.
14. Lillesand, T., Kiefer, R. W., & Chipman, J. (2015). Remote sensing and image interpretation. John Wiley & Sons.
15. Reddy, M. Anji, and Anji Reddy. Textbook of remote sensing and geographical information systems. Hyderabad: BS publications, 2008.
16. Remote Sensing for the Beginner (2016) by Pradip Kumar Guha
17. Rencz, A.N., 2008. Remote Sensing for the Earth Sciences, Manual of Remote Sensing, 3, ASPRS, 703p.
18. Schowengerdt, R. A., 2007. Remote Sensing: Models and Methods for Image Processing, Academic Press.
19. Seeber, G. (2003). Satellite Geodesy 2nd completely revised and extended edition.
20. Van-dr-Meer, F., De Jong, S., 2006. Imaging spectrometry: Basic principles and prospective applications (The Netherlands: Springer Publishers)
