BIRLA INSTITUTE OF TECHNOLOGY

CHOICE BASED CREDIT SYSTEM (CBCS) CURRICULUM

(Effective from Academic Session: Monsoon 2018)

M. TECH REMOTE SENSING

DEPARTMENT OF REMOTE SENSING

Institute Vision

To become a Globally Recognised Academic Institution in consonance with the social, economic and ecological environment, striving continuously for excellence in education, research, and technological service to the National needs.

Institute Mission

- To educate students at Under Graduate, Post Graduate, Doctoral, and Post-Doctoral levels to perform challenging engineering and managerial jobs in industry.
- To provide excellent research and development facilities to take up Ph.D. programmes and research projects.
- To develop effective teaching learning skills and state of art research potential of the faculty.
- To build national capabilities in technology, education, and research in emerging areas.
- To provide excellent technological services to satisfy the requirements of the industry and overall academic needs of society.

Department Vision:

Be a centre of excellence in the field of Geo-spatial Technology education and research to meet the needs of ever increasing requirement of human resources in these fields and to cater to the larger interest of the Society and Nation.

Department Mission

Impart quality education and equip the students with strong foundation that could make them capable of handling challenges of the ever advancing geo-spatial technologies.

Maintain state-of-the-art in research and outreach facilities in phase with the premier institutions for sustained improvement in the quality of education and research.

Programme Educational Objectives (PEOs)

1. To prepare the students in identifying, analysing and solving geospatial problems.

2. To train the students in developing practical and executable solutions to the challenges of growing field of Remote Sensing and GIS.

3. To impart the students with strong base of knowledge that makes them suitable both for industries as well as for teaching and research.

4. To inculcate the students with the sensitivity towards ethics, public policies and their responsibilities towards the society.

Programme Outcomes (POs)

PO1: An ability to independently carry out research /investigation and development work to solve real life geospatial problems.

PO2: An ability to write and present a substantial technical report/document and publish international level research articles.

PO3: Students should be able to demonstrate a degree of mastery over the areas of Remote Sensing and GIS technology. The mastery should be at a level higher than the requirements in the appropriate bachelor program.

PO4: An ability to share theoretical and practical knowledge in both teaching and research as well as in industries.

PO5: An ability to apply professional ethics, accountability and equity.

PROGRAMME COURSE STRUCTURE

SEMESTER - I

	Course Category	Course Code	Subjects	L	T	P	Credit
SEMESTER-I	PC	RS 501	Principles of Remote Sensing and Digital Satellite Image Processing	3	0	0	3
		RS 502	Geographic Information System and Satellite Navigation System	3	0	0	3
		RS 503	Remote Sensing and Digital Satellite Image Processing Laboratory	0	0	4	2
		RS 504	Geographic Information System&Satellite Navigation SystemLaboratory	0	0	4	2
	PE	RS *	ELECTIVE – I	3	0	0	3
		RS *	ELECTIVE – I Laboratory	0	0	4	2
	OE	OPEN ELECTIVE		3	0	0	3
	Total Credits (1st Semester)						**18**

SEMESTER – II

	Course Category	Course Code	Subjects	L	T	P	Credit
SEMESTER-II	PC	RS 511	Aerial and Satellite Photogrammetry & Image Interpretation	3	0	0	3
		RS 512	Advanced Remote Sensing and Geospatial Modelling	3	1	0	4
		RS 513	Aerial and Satellite Photogrammetry & Image Interpretation Laboratory	0	0	4	2
		RS 514	Advanced Remote Sensing and Geospatial Modelling Laboratory	0	0	4	2
		RS 515	Programming and Customisation in geospatial domain Laboratory	0	0	4	2
	PE	RS *	ELECTIVE – II	3	0	0	3
		RS *	ELECTIVE – II Laboratory	0	0	4	2
	OE	OPEN ELECTIVE		3	0	0	3
	Total Credits (2ndSemester)						**21**

SEMESTER – III

	Course Category	Course Code	Subjects	L	T	P	Credit
SEMESTER-III	PC	RS 601	Thesis (Part – I)				8
		RS 602	Data Sources, Statistics and Research Methods in Geospatial Domain	3	1	0	4
	OE	OPEN ELECTIVE / MOOC (excluding already taken courses)		3	0	0	3
	Total Credits (3rd Semester)						**15**

SEMESTER – IV

	Course Category	Course Code	Subjects	L	T	P	Credit
SEMESTER-IV	PC	RS 604	Thesis (Part – II)				16
	Total Credits (4th Semester)						**16**

TOTAL = 70 credits

***ELECTIVE SUBJECTS**

Course No. **Course Title**

PE-I (Semester-I)

RS 505 Remote Sensing in Agriculture & Forestry
RS 506 Remote Sensing in Disaster Management
RS 507 Remote Sensing in Hydrology & Water Resources
RS 508 Remote Sensing in Agriculture & Forestry Laboratory
RS 509 Remote Sensing in Disaster Management Laboratory
RS 510 Remote Sensing in Hydrology & Water Resources Laboratory

PE-II (Semester- II)

RS 516 Remote Sensing in Snow and Glacier Hydrology
RS 517 Remote Sensing in Climate Change and Environmental Impact Assessment
RS 518 Remote Sensing in Snow and Glacier Hydrology Laboratory
RS 519 Remote Sensing in Climate Change and Environmental Impact Assessment Laboratory

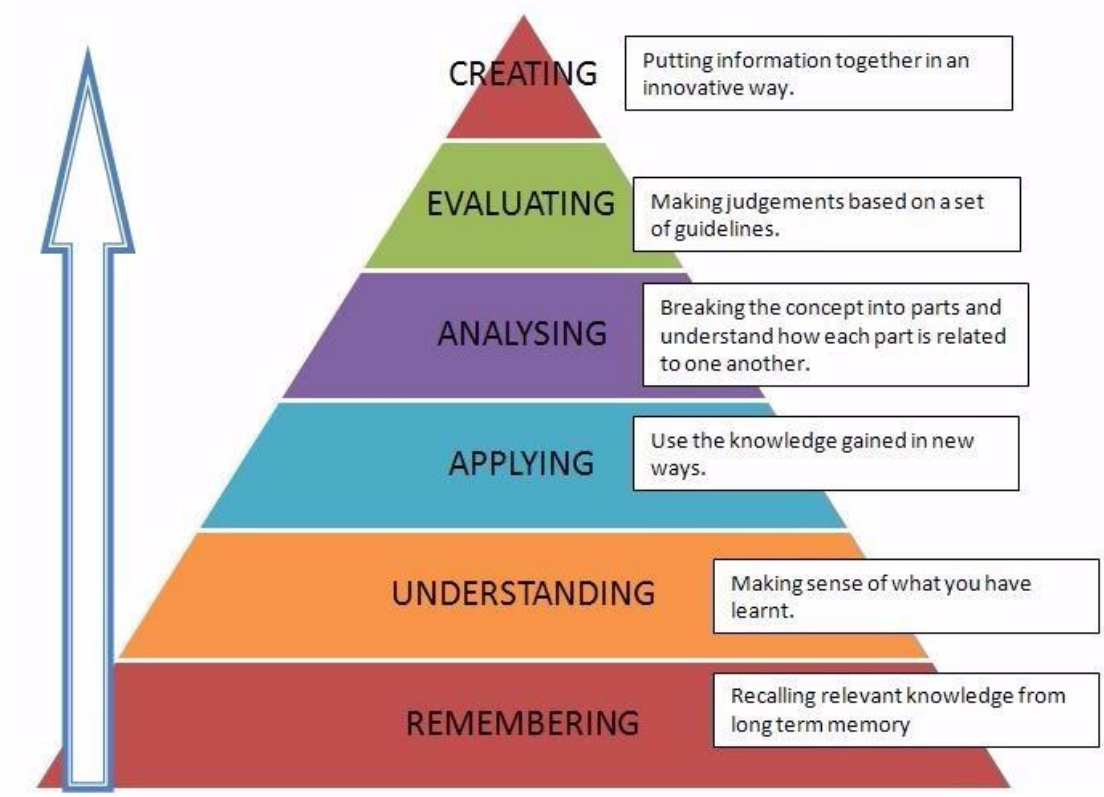
Thesis (Part – I) – Focus on Problem definition, Literature Review, Data Collection, Objectives and Research Qeustions Formulation and Detailed Work Plan, and partial fulfillment of initial objectives.

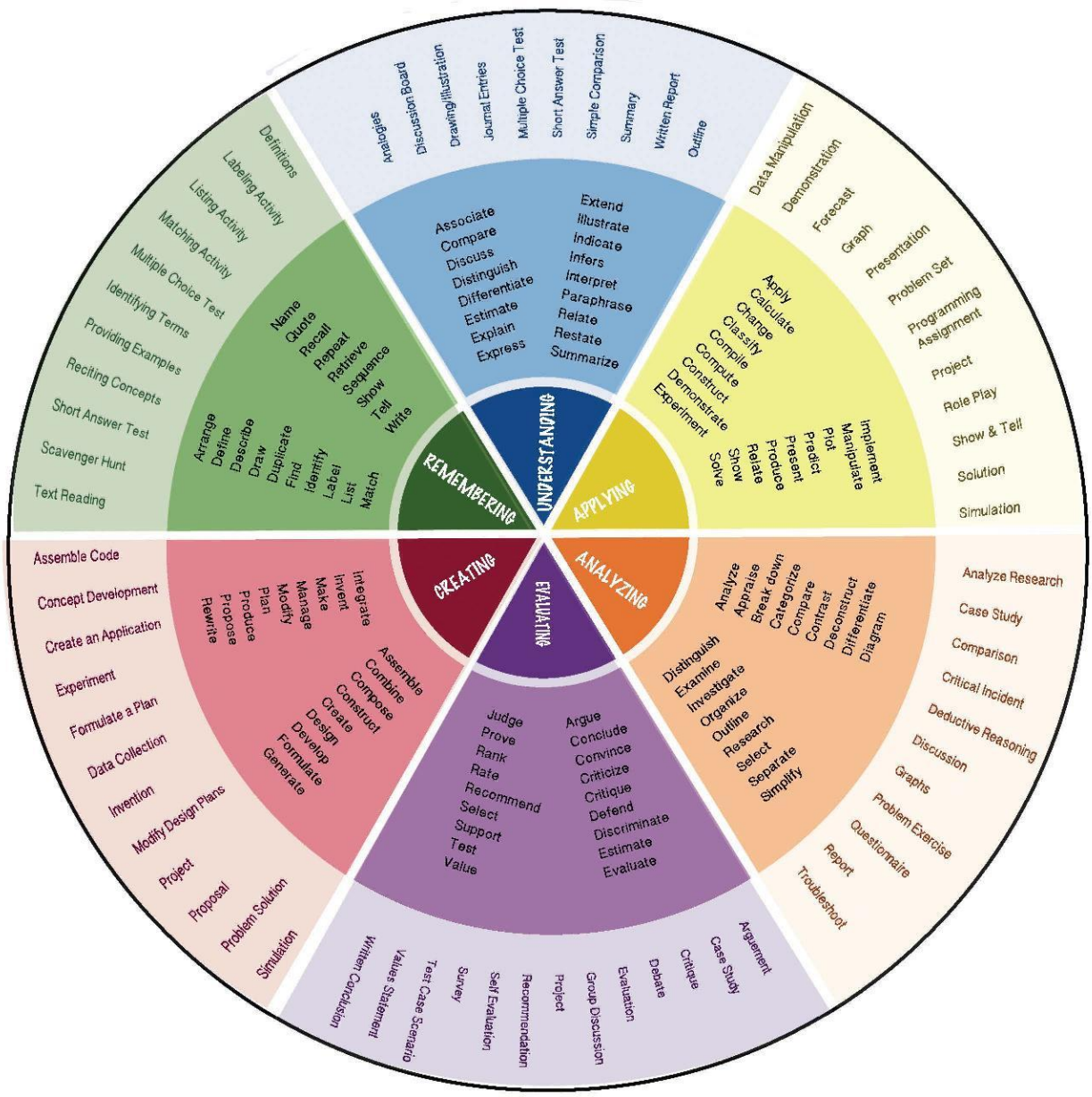
Thesis (Part – II) – Focus on systematic execution of work plan, data processing, analysis, interpretation, inferences and fulfillment of objectives and research questions, and report preparation, and finally leading to a research publication in peer reviewed journals.

BLOOM'S TAXONOMY FOR CURRICULUM DESIGN AND ASSESSMENT:

Preamble

The design of curriculum and assessment is based on Bloom's Taxonomy. A comprehensive guideline for using Bloom's Taxonomy is given below for reference.




REMEMBERING
UNDERSTANDING
APPLYING
ANALYZING
EVALUATING
CREATING
Name
Quote
Recall
Repeat
Retrieve
Sequence
Show
Tell
Write
Arrange
Define
Describe
Draw
Duplicate
Find
Identify
Label
List
Match
Associate
Compare
Discuss
Distinguish
Differentiate
Estimate
Explain
Express
Extend
Illustrate
Indicate
Infers
Interpret
Paraphrase
Relate
Restate
Summarize
Apply
Calculate
Change
Classify
Compile
Compute
Construct
Demonstrate
Experiment
Implement
Manipulate
Predict
Present
Produce
Relate
Show
Solve
Analyze
Appraise
Break down
Categorize
Compare
Contrast
Deconstruct
Differentiate
Diagram
Distinguish
Examine
Investigate
Organize
Outline
Research
Select
Separate
Simplify
Argue
Conclude
Convince
Criticize
Critique
Defend
Discriminate
Estimate
Evaluate
Judge
Prove
Rank
Rate
Recommend
Select
Support
Test
Value
Assemble
Combine
Compose
Construct
Create
Design
Develop
Formulate
Generate
Integrate
Invent
Make
Manage
Modify
Plan
Produce
Propose
Rewrite
Definitions
Labeling Activity
Listing Activity
Matching Activity
Multiple Choice Test
Identifying Terms
Providing Examples
Reciting Concepts
Short Answer Test
Scavenger Hunt
Text Reading
Analogies
Discussion Board
Drawing/Illustration
Journal Entries
Multiple Choice Test
Short Answer Test
Simple Comparison
Summary
Written Report
Outline
Data Manipulation
Demonstration
Forecast
Graph
Presentation
Problem Set
Programming Assignment
Project
Role Play
Show & Tell
Solution
Simulation
Analyze Research
Case Study
Comparison
Critical Incident
Deductive Reasoning
Discussion
Graphs
Problem Exercise
Questionnaire
Report
Troubleshoot
Argument
Case Study
Critique
Debate
Evaluation
Group Discussion
Project
Recommendation
Self Evaluation
Survey
Test Case Scenario
Values Statement
Written Conclusion
Assemble Code
Concept Development
Create an Application
Experiment
Formulate a Plan
Data Collection
Invention
Modify Design Plans
Project
Proposal
Problem Solution
Simulation

COURSE INFORMATION SHEET

SEMSETER III

Course code: RS602
Course title: Data Sources, Statistics and Research Methods in Geospatial Domain
Pre-requisite(s): Knowledge of statistics
Co- requisite(s): Knowledge of RS & GIS

Credits:	L:	T:	P:	C:
	3	1	0	4

Class schedule per week: 4
Class: M. TECH
Semester / Level: 03/06 (Monsoon)
Branch: REMOTE SENSING
Name of Teacher:

Course Objectives:

This course aims to make the students:

1.	Learn about various geo-spatial data providers at global and national level.
2.	Understand various steps and important components involved in project management, field report preparation, and sampling statistics.
3.	Gain knowledge about importance of quality, ethics, and different research methods being used in the geo-spatial domain.

Course Outcomes:

On completion of this course, students should be able to:

CO1.	Explain the formulation of various schemes in Geoinformatics domain
CO2.	Write Project reports and project proposals
CO3.	Apply research methods quantitatively and qualitatively
CO4.	Use the National/Global standards of research

Syllabus

MODULE	(NO. OF LECTURE HOURS)
Module – I Geo-Spatial Research &Data Sources Geo-spatial Research Problems. National and International Projects: Past and Recent, Different types of Geo-spatial data requirement, USGS Global Visualization Viewer (GloVis), NASA Earth Observation (NEO), USGS Earth Explorer, ESA's Sentinel data, NOAA, IPMUS Terra, LANCE, VITO Vision, Bhuvan, MOSDAC, India-WRIS, Identification of problems at regional and Local level.	**9**
Module – II Field and project requirements Need for Field Visit and Preparation of field reports, Research proposal, Literature review, Project/Report Writing, Components of Research Thesis/Project Report, Project Administrator and project management, Classification of Projects/thesis, Problems and opportunities in Projects.	**8**
Module – III Sampling and Statistics Statistical Concepts: Population, Sample, Random, Bias, Percentile, Standard Score, Distribution, Correlation, Regression (logistic, linear), Analysis of variance, Need for sampling, types of sampling, sample size estimation and accuracy evaluation. Hypotheses and its testing, chi-square test, t-test, Calculation and Evaluation of Confidence Intervals.	**8**
Module – IV Methods in Geoinformatics Types of Research Methods: Quantitative and Qualitative, Research Techniques and Tools: Questionnaire, Interview, Observation, etc., Analytical methods in Geoinformatics, Different models in various Natural Resources Monitoring.	**8**
Module – V Tools, Quality and Ethics Tools & Methods: Project Communications and Presentation, Intellectual property Right, Plagiarism and associated softwares, Evaluating Quality of Research paper/journal: Citation Index, Impact Factor, National/Global standards, SCI, SCOPUS, etc., Referencing/Citation methods, Reference management software.	**7**

TEXT BOOKS:

1. Deborah Rumsey (2003). Statistics for Dummies, Wiley Publishing, Inc.,New Jersey.
2. Huxold, W.E. and Levinsohn A.G. (1995). Managing Geographic Information Projects. Oxford University Press, New York.
3. Earickson, R. and Harlin, J. (1994). Geographic Measurement & Quantitative Analysis, Macmillan, New York

REFERENCE BOOKS:

1. Bennet P. Lientz&Kathryn P., (2001) Project Management for the 21st Century Academic Press, California.
2. Miguel Roig (2015). Avoiding plagiarism, self-plagiarism, and other questionable writing practices: A guide to ethical writing. (https://ori.hhs.gov/sites/default/files/plagiarism.pdf)

COURSE OUTCOME (CO) ATTAINMENT ASSESSMENT TOOLS & EVALUATION PROCEDURE

Direct Assessment

Assessment Tool	% Contribution during CO Assessment
Continuous Internal Assessment	50
Semester End Examination	50

Continuous Internal Assessment	% Distribution
3 Quizzes	30 % (3 × 10%)
Assignment (s)	10
Seminar before a committee	10

Indirect Assessment –

1. Student Feedback on Course Outcome

Course Evaluation:

Individual assignment, Quizes, and End semester examinations

MAPPING BETWEEN COURSE OUTCOMES AND PROGRAMME OUTCOMES

	PO1	PO2	PO3	PO4	PO5
CO1			2	3	
CO2	2	3			3
CO3	3	2		2	1
CO4	3	3		2	3

Correlation Levels 1, 2 or 3 as defined below:

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

Course Delivery (CD) methods

CD Code	Course Delivery Methods
CD1	Lecture by use of Boards/LCD Projectors
CD2	Tutorials/Assignments
CD3	Seminars
CD4	Mini Projects/Projects
CD5	Laboratory Experiments/Teaching Aids
CD6	Industrial/Guest Lectures
CD7	Industrial Visits/In-plant Training
CD8	Self- learning such as use of NPTEL Materials and Internets
CD9	Simulation

MAPPING BETWEEN COURSE OUTCOMES AND COURSE DELIVERY METHOD

Course Outcomes	Course Delivery Method
CO1	CD1, CD2, CD3, CD8
CO2	CD1, CD2, CD3, CD8
CO3	CD1, CD2, CD3, CD5, CD8
CO4	CD1, CD2, CD3, CD6, CD8

Course code: RS 601 & RS 604
Course title: RESEARCH PROJECT (Thesis Part I and II)
Pre-requisite(s): Completion of all Labs of 1st and 2nd semester
Co- requisite(s):

Credits:	L:	T:	P:	C:
	0	0		8+16

Class schedule per week: 4
Class: M. TECH
Semester / Level: 03&04/06
Branch: REMOTE SENSING

Course Objectives:

This course aims to make the student with following abilities:

A.	Carry out Independent Research Project addressing real life geospatial problems with sound scientific framework.
B.	Prepare thematic and topographic maps from satellite data and other sources, and Utilise various Geospatial processing and modelling techniques and Create research report with acceptable quality and ethics, and communicate results to stakeholders.

Course Outcomes:

On completion of this course, students should be able to:

CO1	Identify, Collect, Compare, evaluate and summarise relevant existing literatures related to the problem in hand.
CO2	Identify Research Gaps, Develop appropriate research questions and Objectives in relation to their domain of research.
CO3	Design Research Strategy and Methodology and Create coherent geospatial database and other relevant data for each objective.
CO4	Apply Geospatial, Geostatistical, Statistical tools and techniques, and evaluate the appropriateness of results in relation to objectives and research questions.
CO5	Integrate, interpret and synthesis all results and write a scientifically sound academic report with appropriate referencing, and communicate research findings to stakeholders and in peer reviewed journal/conferences.

Mapping Course Outcome with Programme Outcome

	PO1	**PO2**	**PO3**	**PO4**	**PO5**
CO1	1	2	2	3	3
CO2	2	3	2	2	3
CO3	3	2	2	3	3
CO4	3	3	3	2	1
CO5	3	3	3	3	3

Correlation Levels 1, 2 or 3 as defined below:

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)