

Course Structure & Syllabus

M.Tech. Remote Sensing



Department of Remote Sensing
Birla Institute of Technology
Mesra, Ranchi- 835215
Jharkhand, INDIA
Restructured and applicable from
Session 2021-22 onwards

Institute Vision

To become a Globally Recognized 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 Undergraduate, 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 and 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)	Programme Outcomes (POs)
1. To prepare the students in identifying, analysing and solving geospatial problems.	1. An ability to independently carry out research /investigation and development work to solve real life geospatial problems.
2. To train the students in developing practical and executable solutions to the challenges of growing field of Remote Sensing and GIS.	2. An ability to write and present a substantial technical report/document and publish international level research articles.
3. To impart the students with strong base of knowledge that makes them suitable both for industries as well as for teaching and research.	3. 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.
4. To inculcate the students with the sensitivity towards ethics, public policies and their responsibilities towards the society.	4. An ability to share theoretical and practical knowledge in both teaching and research as well as in industries.
	5. An ability to apply professional ethics, accountability and equity.

M.TECH REMOTE SENSING**PROGRAMME SCHEME - SEMESTER WISE DISTRIBUTION**

S. No	Semester	Course Category	Credits	Total
1	FIRST	2 Programme Core (PC)	8	19
		1 Programmet Elective (PE)	3	
		4 LABS (2 PC + 2 PE)	8	
2	SECOND	3 Programme Core (PC)	10	19
		1 Programme Elective (PE)	3	
		3 LABS (2 PC + 1 PE)	6	
3	THIRD	Research Project	8	14
		Open Elective (OE-I)/MOOC	3	
		Open Elective (OE-II)/MOOC	3	
4	FOURTH	Research Project	16	16
TOTAL				68

MASTER OF TECHNOLOGY (Remote Sensing)**PROGRAMME CORE (PC) (offered in MO session only)**

S. No	Course Code	Course Title	Pre requisites / Co requisites	Credits
1	RS 501R1	Principles of Remote Sensing and Digital Satellite Image Processing	Basic Physics/Science Computer Knowledge	4
2	RS 502R1	Geographic Information System and Satellite Navigation System	Basic Sciences/ Basic Computing	4
3	RS 503	Remote Sensing and Digital Satellite Image Processing Laboratory	RS 501	2
4	RS 504	GIS &Satellite Navigation System Laboratory	RS 502	2
5	RS 515	Programming and Customisation in geospatial domain Laboratory	RS 501, RS 502	2

PROGRAMME CORE (PC) (offered in SP session only)

S. No	Course Code	Course Title	Pre requisites / Co requisites	Credits
1	RS 511	Aerial and Satellite Photogrammetry & Image Interpretation	RS 501	3
2	RS 512	Advanced Remote Sensing and Geospatial Modelling	RS 501, RS 502	4
3	RS 513	Aerial and Satellite Photogrammetry & Image Interpretation Laboratory	RS 511	2
4	RS 514	Advance Remote Sensing and Geospatial Modelling Laboratory	RS 512	2
5	RS 521	Data Sources, Statistics and Research Methods in Geospatial Domain	RS 501, RS502	3

ELECTIVES

Students pursuing M. Tech in Remote Sensing Technology should complete at least three (09 credits) courses each from the Programme Electives and atleast 2 Open electives (06 credits) listed below.

PROGRAMME ELECTIVE (PE) (Theory & Laboratory)

S. No	Course Code	Course Title	Pre requisites / Co requisites	Credits
GROUP-A (MO session only)				
1	RS 505	Remote Sensing in Agriculture & Forestry	RS 501 & RS 502.	3
2	RS 506	Remote Sensing in Disaster Management		3
3	RS 507	Remote Sensing in Hydrology & Water Resources		3

4	RS 508	Remote Sensing in Agriculture & Forestry Laboratory	RS 503, RS 504 & RS 505	2
5	RS 509	Remote Sensing in Disaster Management Laboratory	RS 503, RS 504 & RS 506	2
6	RS 510	Remote Sensing in Hydrology & Water Resources Laboratory	RS 503, RS 504 & RS 507	2
GROUP-B (SP session only)				
7	RS 516	Remote Sensing in Snow and Glacier Hydrology	RS 501, RS 502	3
8	RS 517	Remote Sensing in Climate Change and Environmental Impact Assessment	RS 501 & RS 502	3
9	RS 518	Remote Sensing in Snow and Glacier Hydrology Laboratory	RS 503, RS 504 & RS 516	2
10	RS 519	Remote Sensing in Climate Change and Environmental Impact Assessment Laboratory	RS 503, RS 504 & RS 517	2

OPEN ELECTIVE (OE)

These open elective courses are available only to candidates from other departments. However, all the courses (listed below) may not be announced in a semester. Students are requested to contact the department Head or Coordinator to know the availability on semester basis.

Choice A: Open Electives (beginner level)

GI 501 Principles of Remote Sensing (Theory = 3 Credits) – Monsoon Semester

GI 505 Principles of Remote Sensing (Laboratory = 2 Credits) – Monsoon Semester

RS 502 Geographic Information System and Satellite Navigation System (Theory = 3 Credits) – Monsoon Semester

RS 504 Geographic Information System and Satellite Navigation System Lab (Laboratory = 2 Credits) – Monsoon Semester

GI 509 Digital Satellite Image Processing (Theory = 4 Credits) – Spring Semester

GI 511 Digital Satellite Image Processing (Laboratory = 2 Credits) – Spring Semester

RS 520 Real World Operationalisation of GIS and GNSS (3 Credits) – Spring Semester

Choice B: Open Electives (Advanced level)

RS 511 Aerial and Satellite Photogrammetry & Image interpretation (Theory = 3 Credits) – Spring Semester

RS 513 Aerial and Satellite Photogrammetry & Image interpretation (Laboratory = 2 Credits) – Spring Semester

GI 602 Advanced Geo-Spatial Modelling and Decision Support System (Theory = 4 Credits) – Spring Semester

GI 604 Advanced Geo-Spatial Modelling and Decision Support System (Laboratory = 2 Credits) – Spring Semester

RS 507 Remote Sensing in Hydrology & Water Resources (Theory = 3 Credits) – Monsoon Semester

RS 510 Remote Sensing in Hydrology & Water Resources (Laboratory = 2 Credits) – Monsoon Semester

MINOR PROGRAMME

Minor in Remote Sensing: (minimum required credits = 12) (Only for Students from OTHER DEPARTMENTS). Subjects can be chosen from the list of Open Electives.

Beginner Level Credit Requirement = 6 Credits

Advanced Level Credit Requirement = 6 Credits

COURSE STRUCTURE**SEMESTER - I**

SEMESTER-I	Course Category	Course Code	Subjects	L	T	P	Credit
	PC	RS 501R1	Principles of Remote Sensing and Digital Satellite Image Processing	3	1	0	4
		RS 502R1	Geographic Information System and Satellite Navigation System	3	1	0	4
		RS 503	Remote Sensing and Digital Satellite Image Processing Laboratory	0	0	4	2
		RS 504	Geographic Information System & Satellite Navigation System Laboratory	0	0	4	2
		RS 515	Programming and Customisation in geospatial domain Laboratory	0	0	4	2
	PE	RS *	ELECTIVE – I	3	0	0	3
		RS *	ELECTIVE – I Laboratory	0	0	4	2
Total Credits (1 st Semester)							19

SEMESTER – II

SEMESTER-II	Course Category	Course Code	Subjects	L	T	P	Credit
	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 521	Data Sources, Statistics and Research Methods in Geospatial Domain	3	0	0	3
	PE	RS *	ELECTIVE – II	3	0	0	3
		RS *	ELECTIVE – II Laboratory	0	0	4	2
Total Credits (2 nd Semester)							19

SEMESTER – III

SEMESTER-III	Course Category	Course Code	Subjects	L	T	P	Credit
	PC	RS 601	Thesis (Part – I)				8
	OE I	OPEN ELECTIVE / MOOC		3	0	0	3
	OE II	OPEN ELECTIVE / MOOC		3	0	0	3
	Total Credits (3 rd Semester)						

SEMESTER – IV

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

TOTAL = 68 credits

PROGRAMME ELECTIVES

Course No.	Course Title
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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

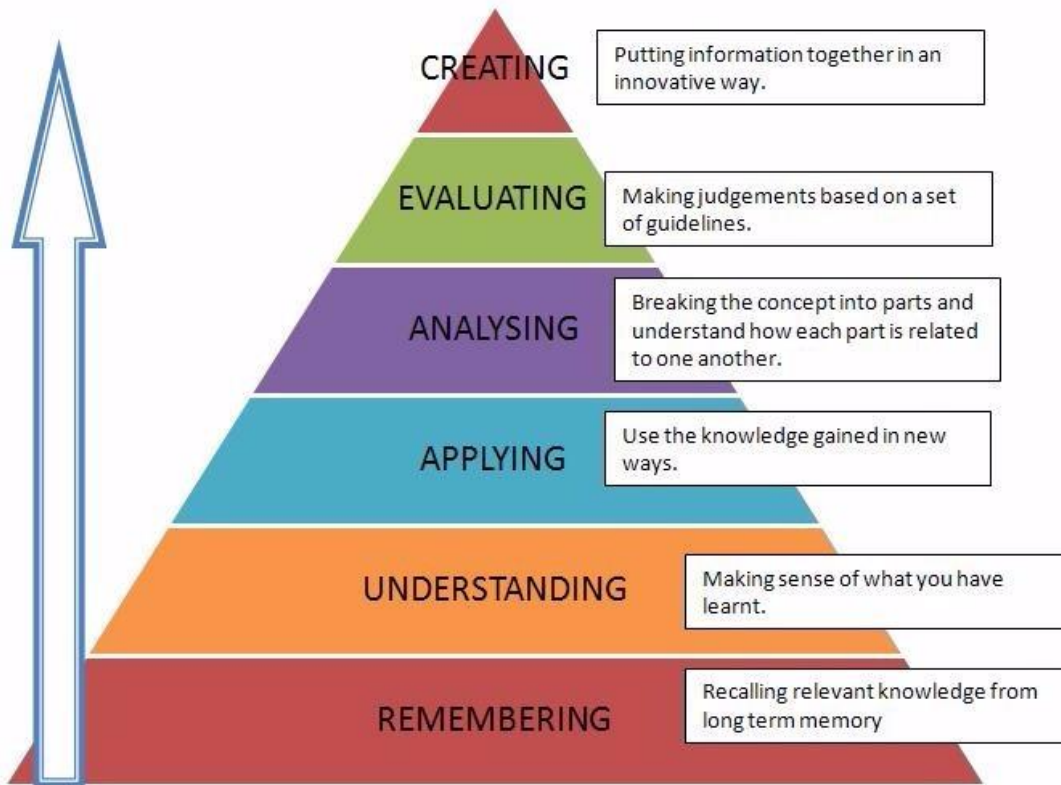
THESIS (Programme Core)

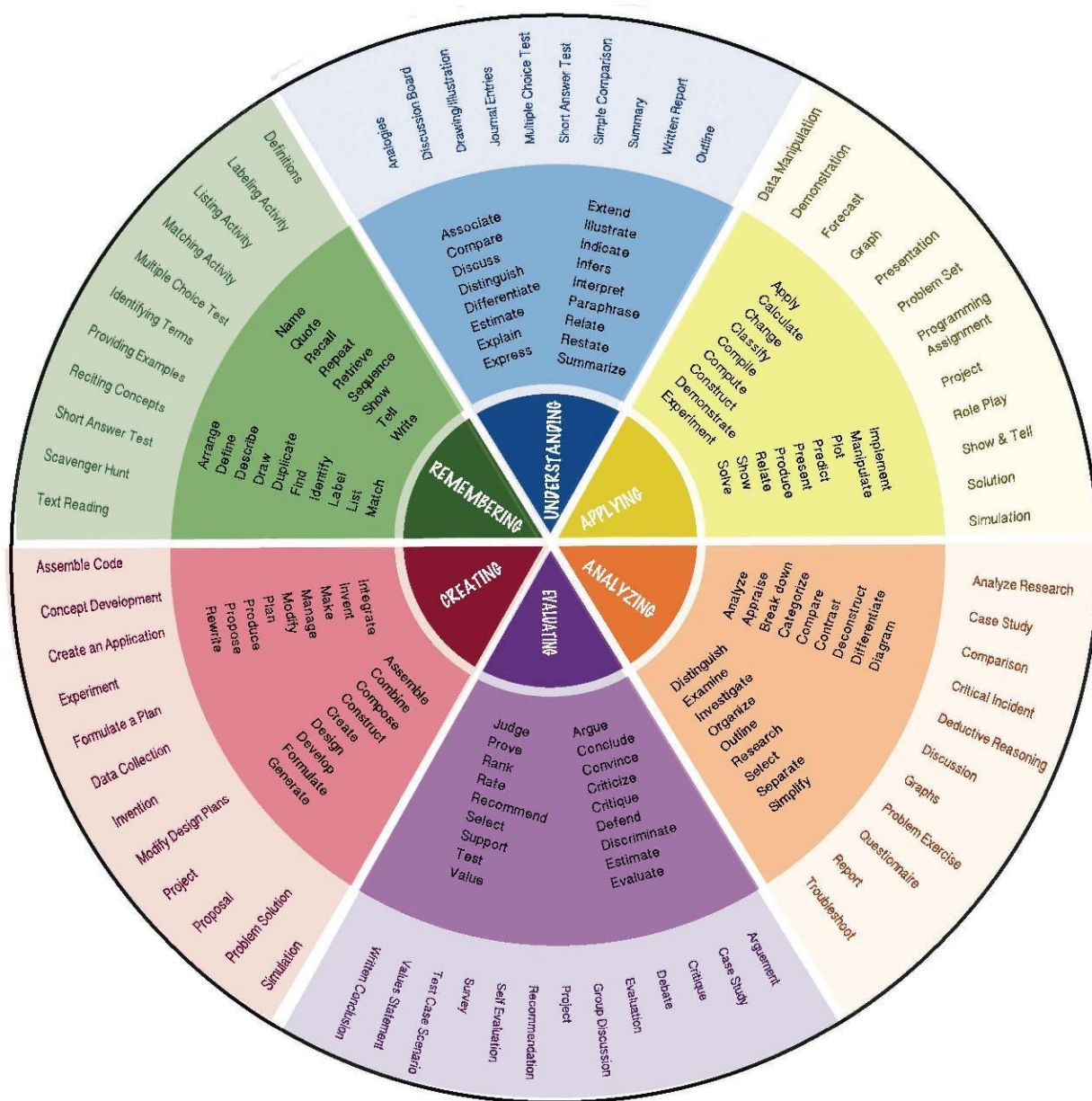
RS 601 - Thesis (Part – I) – Focus on Problem definition, Literature Review, Data Collection, Objectives and Research Questions Formulation and Detailed Work Plan, and partial fulfillment of initial objectives.

RS 604 - 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.





M. Tech. (REMOTE SENSING)
SEMESTER III

Course code: RS 601

Course title: RESEARCH PROJECT (Thesis Part I)

Pre-requisite(s): Basic physics

Co- requisite(s):

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

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 (CO):

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

3	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

Low = 1, Medium = 2, High= 3