



# बिरसा मुंडा ट्रायबल युनिवर्सिटी Birsamunda Tribal University

राजपिपला, जि० नर्मदा Rajpipla, Dist. Narmda

Established by Tribal Development Department, Govt. of Gujarat

## School of Science

### M.Sc. (Zoology) Programme

**Subject Code& Name:** - MS01SZOO01 – GIS and Remote Sensing

#### Teaching and Evaluation Scheme:

| Teaching Scheme |    |    |       | Examination Scheme  |     |          |     |
|-----------------|----|----|-------|---------------------|-----|----------|-----|
| Credits         |    |    |       | Component Weightage |     |          |     |
|                 |    |    |       | Internal            |     | External |     |
| L               | T  | P  | Total | TH                  | PWE | TH       | PWE |
| 2               | -- | -- | 2     | 25%                 | --  | 25%      | --  |

|                               |                        |
|-------------------------------|------------------------|
| Programme Name                | M.Sc. Zoology          |
| Semester                      | I                      |
| Course Code                   | MS01SZOO01             |
| Course Title                  | GIS and Remote Sensing |
| Course Content Type (Th./Pr.) | Theory                 |
| Course Credit                 | 2                      |
| Sessions+ Lab. Per Week       | 2                      |
| Total Teaching/Lab. Hours     | 30 Hours               |
| * 2 Laboratory = 1 Session    |                        |

#### Learning Objectives

- To introduce the principles and techniques of GIS and Remote Sensing.
- To understand spatial data acquisition, processing and analysis.
- To apply geospatial technologies in biodiversity, wildlife and conservation studies.

#### Prerequisites (if any)

- Basic knowledge of Ecology and Environmental Science.
- Understanding of Biodiversity and Wildlife Biology.
- Basic computer skills and map reading.

#### Learning Outcomes

After successful completion of the course, students will be able to:

- Explain the basic concepts and principles of GIS and Remote Sensing.
- Interpret and analyze spatial and satellite-derived data.
- Apply GIS and Remote Sensing tools in biodiversity, ecological and wildlife research.
- Use geospatial information for conservation planning and environmental management.



Established by Tribal Development Department, Govt. of Gujarat

**School of Science**  
**M.Sc. (Zoology) Programme**

| Detailed Contents |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                |
|-------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|
| UNIT              | TOPIC/SUB-TOPIC                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | TEACHING HOURS |
| I                 | <b>Fundamentals of GIS and Remote Sensing</b> <ul style="list-style-type: none"> <li>• Introduction, scope and applications of GIS and Remote Sensing</li> <li>• History and development of Remote Sensing</li> <li>• Electromagnetic Radiation (EMR) and Electromagnetic Spectrum</li> <li>• Interaction of EMR with atmosphere and earth surface</li> <li>• Spectral signatures of vegetation, water and soil</li> <li>• Remote sensing platforms and sensors</li> <li>• Satellite missions: Landsat, IRS and Sentinel</li> <li>• Components of GIS</li> <li>• Spatial and non-spatial data</li> <li>• Raster and vector data models</li> <li>• GPS, coordinate systems and map projections</li> <li>• Sources of geospatial data</li> <li>• GIS software and data management</li> </ul>                         | 15             |
| II                | <b>Spatial Analysis and Applications in Zoology</b> <ul style="list-style-type: none"> <li>• Visual interpretation of satellite imagery</li> <li>• Image enhancement and classification</li> <li>• Land Use and Land Cover (LULC) mapping</li> <li>• Change detection analysis</li> <li>• Buffer and overlay analysis</li> <li>• Digital Elevation Models (DEM), slope and aspect analysis</li> <li>• Biodiversity mapping and monitoring</li> <li>• Wildlife habitat assessment</li> <li>• Habitat suitability modelling</li> <li>• Forest cover and vegetation analysis</li> <li>• Habitat fragmentation and corridor analysis</li> <li>• GIS and Remote Sensing applications in wildlife conservation and protected area management</li> <li>• Applications of UAVs and drones in ecological studies</li> </ul> | 15             |



# बिरसा मुंडा ट्रायबल यूनिवर्सिटी Birsā Mūṇḁā Drāyabala Yūnīvārsīṭī

राजपिपला, जि० नर्मदा Rajpipla, Dist. Narmda

Established by Tribal Development Department, Govt. of Gujarat

## School of Science M.Sc. (Zoology) Programme

### Text Book(s)

1. Fundamentals of Remote Sensing by George Joseph, Universities Press.
2. Remote Sensing and Image Interpretation by Thomas M. Lillesand, Ralph W. Kiefer and Jonathan W. Chipman, Wiley India.
3. Geographic Information Systems and Science by Paul A. Longley, Michael F. Goodchild, David J. Maguire and David W. Rhind, Wiley.
4. Remote Sensing and Geographical Information Systems by M. Anji Reddy, BS Publications.

### Reference Books

1. GIS Fundamentals: A First Text on Geographic Information Systems by Paul Bolstad, XanEdu Publishing.
2. Remote Sensing of the Environment: An Earth Resource Perspective by John R. Jensen, Pearson Education.
3. Principles of Geographical Information Systems by Peter A. Burrough and Rachael A. McDonnell, Oxford University Press.
4. Landscape Ecology in Theory and Practice by Monica G. Turner and Robert H. Gardner, Springer.
5. Geospatial Technologies in Land Resources Mapping, Monitoring and Management, by Reddy G. P. Obi and Singh S. K., Springer.

### Web Resources

1. ISRO Bhuvan Geoportal – <https://bhuvan.nrsc.gov.in>
2. NASA ARSET – <https://appliedsciences.nasa.gov/arset>
3. USGS Earth Explorer – <https://earthexplorer.usgs.gov>
4. Sentinel Hub – <https://www.sentinel-hub.com>
5. QGIS Documentation – <https://docs.qgis.org>
6. GIS Geography – <https://gisgeography.com>
7. GBIF – <https://www.gbif.org>
8. Protected Planet – <https://www.protectedplanet.net>
9. Google Earth Engine – <https://developers.google.com/earth-engine>
10. NPTEL – <https://nptel.ac.in>

### Required Software(s) (if any)

1. QGIS – <https://qgis.org>
2. GRASS GIS – <https://grass.osgeo.org>
3. SAGA GIS – <https://saga-gis.sourceforge.io>



# बिरसा मुंडा ट्रायबल युनिवर्सिटी Birsa Munda Tribal University

राजपिपला, जि० नर्मदा Rajpipla, Dist. Narmda

Established by Tribal Development Department, Govt. of Gujarat

## School of Science

### M.Sc. (Zoology) Programme

**L::** Lecture, **T::** Tutorial , **P::** Practical

**PWE::** Practical Work Examination

(PWE includes Laboratory practical work, project work, viva simulation exercise work etc.)

