BHARATHIDASAN UNIVERSITY TIRUCHIRAPPALLI - 620 024.

ALLIED GEOINFORMATICS FOR B.Sc. GEOGRAPHY PROGRAMMES

(For the candidates admitted from the academic year 2022-23 onwards)

ALLIED COURSE I
GEOINFORMATICS I

Code: **(Theory)** **Credit: 4**

COURSE OBJECTIVES:

- The objectives of this course are to introduce the basic concepts of Geoinformatics.
- The course would discuss about the image acquisition systems, data collection and processing.
- The working principles of GIS and GNSS will be discussed in this course.

UNIT – I INTRODUCTION:

Components of Geoinformatics: cartography, geodesy, photogrammetry, remote sensing: active and passive, GIS and GNSS - historical development - emerging trends - multidisciplinary nature – spatial information – map and scale.

UNIT – II REMOTE SENSING PRINCIPLES:

Basic principles - Elements of EMR - Energy interaction in atmosphere - Terrestrial interaction - Spectral signature – Spectral reflectance curves -.

UNIT – III AERIAL PHOTOGRAPHY:

Types of photographs - Aerial triangulation - Photogrammetry - Visual interpretation: Equipment's - Elements of image interpretation

UNIT – IV SATELLITE REMOTE SENSING:

Platforms - Sensors - FOV and IFOV - Pixel - Resolution: spatial, spectral, radiometric and temporal - Earth observation satellites: weather satellites, land and marine observation satellites -

UNIT – V IMAGE PRE-PROCESSING:

Image enhancement – filtering - Image classification - Accuracy assessment - Applications.

REFERENCES:

1. Gomarasca, M. A. (2009) Basics of Geometrics, Springer Science, New York
2. Lillisand T.M and R.W. Kiefer (1994) Remote Sensing and Image Interpretation. John Wiley & Sons, New York.

3. Burrough, P. A., & McDonnell, R., (2000). Principles of Geographical Information Systems, Oxford Press, London.
4. Agarwal, N. K., (2006). Essentials of GPS, Geodesy and GPS publications, Hyderabad.
5. Jensen, J. R., (2007). Remote Sensing of the Environment: An Earth Resource Perspective, Prentice-Hall Inc., New Jersey.
6. Hofmann W., Lichtenegger, &Wasle, (2008).Global Navigational Satellite Systems, Springer Wien New York.
7. Jensen, J.R., (2006). Introductory Digital Image Processing: A Remote Sensing Perspective, Prentice-Hall Inc., New Jersey.
8. Heywood, I., Comelius, S., and Carver, S., (1988). An Introduction to Geographical Information Systems, Addison Wiley Longmont, New York.

COURSE OUTCOMES:

On the completion of syllabus students must be able to:

- The course enables the students to understand the concepts of GIS and GNSS.
- It helps to collect, analyse, store, manipulate and display the spatial data.
- It facilitates students to apply the concepts of remote sensing and image processing techniques.
- The students will be able to solve the real time problems using GIS.
- It enhances the knowledge on image pre-processing and image enhancement.

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ALLIED PRACTICAL
GEOINFORMATICS

Code: **(Practical)** **Credit: 2**

COURSE OBJECTIVES:

- To make the students know about spatial data structures
- To impart knowledge on working with vector and raster data formats
- To effectively visualize the spatial data

Ex. 01: Fundamentals and Components of Geoinformatics
Ex. 02: Spatial and Non-spatial data structures
Ex. 03: Geodatabase Creation and Spatial Data Types
Ex. 04: Spatial Referencing
Ex. 05: Data Collection and Conversion
Ex. 06: Attribution and joining
Ex. 07: Simple Vector Analysis
Ex. 08: Raster Data Pre-processing
Ex. 09: Raster Data Corrections
Ex. 10: Simple Raster Analysis
Ex. 11: GPS Data Collection and Import
Ex. 12: Data Visualization

CURRENT CONTOURS (For continuous internal assessment only):

Erdas Imagine, ArcGIS.

REFERENCES:

1. Lillisand. T.M., and Kiefer, P.W., (1998). Remote Sensing and Image Interpretation, John Wiley & Sons, New York.
2. Jensen, J. R., (2007). Remote Sensing of the Environment: An Earth Resource Perspective, 2nd Edition, Prentice-Hall Inc., New Jersey.
3. Jensen, J. R., (2006). Introductory Digital Image Processing: A Remote Sensing Perspective, 3rd Edition, Prentice-Hall Inc., New Jersey.
4. Paul Gibson, and Clare H. Power, (2000). Introductory Remote Sensing: Digital Processing and Applications, Routledge Publisher, London.
5. Richards, J. A. and Jia Xiuping (2005). Remote Sensing Digital Image Analysis: An Introduction, 4th Edition, Springer –Verlag, Berlin.
6. Gupta. R.P., (2005). Remote Sensing Geology (2nd Edition), Springer India, New Delhi.

COURSE OUTCOMES:

On the completion of syllabus students must be able to:

- The purpose of this work is to provide students with support material that stimulates and can be a starting point to the use of Remote Sensing (RS) products in classroom.
- Practical Interpretation provide the student with a positive knowledge of this technology, making the student understand the processes used in attaining images and interpreting them.
- Provide an introduction related to RS more practical than technical.
- Granting a privilege to real important information in order to reach an understanding level of how images are generated processed, corrected, and so on, without missing the point through technical details.
- Attain 3 dimensional views from pocket and mirror stereoscope.

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ALLIED PRACTICAL
GEOINFORMATICS

Code: **(Practical)** **Credit: 2**

COURSE OBJECTIVES:

- To introduce basic knowledge on performing editing digital spatial data
- To perform basic vector and raster analysis
- To perform basic image processing

Ex. 01: Spatial Transformations
Ex. 02: Rescale and Move
Ex. 03: Attribute Join
Ex. 04: Spatial Join
Ex. 05: Working with Queries
Ex. 06: Spatial Interpolation
Ex. 07: Multi-Layer Analysis
Ex. 08: Spatial Statistics
Ex. 09: Band Ratioing
Ex. 10: Raster Calculation
Ex. 11: Image Classification
Ex. 12: Map Algebra

CURRENT CONTOURS (For continuous internal assessment only):

ArcGIS Pro, ERDAS, QGIS, and AutoCAD Map 3D

REFERENCES:

1. Lillisand. T.M., and Kiefer, P.W., (1998). Remote Sensing and Image Interpretation, John Wiley & Sons, New York.
2. Jensen, J. R., (2007). Remote Sensing of the Environment: An Earth Resource Perspective, 2nd Edition, Prentice-Hall Inc., New Jersey.
3. Jensen, J. R., (2006). Introductory Digital Image Processing: A Remote Sensing Perspective, 3rd Edition, Prentice-Hall Inc., New Jersey.
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6. Gupta. R.P., (2005). Remote Sensing Geology (2nd Edition), Springer India, New Delhi.

COURSE OUTCOMES:

On the completion of syllabus students must be able to:

- The purpose of this practical is to advance the students to use GIS & Remote Sensing (RS)
- Perform mastery level use of GIS and Remote Sensing tools
- Can integrate multiple layers in analysis
- Perform advanced analysis in GIS & Remote Sensing platforms
- Can do precise and accurate analysis

ALLIED COURSE II
GEOINFORMATICS

Code: **(Theory)** **Credit: 4**

COURSE OBJECTIVES:

- The course provides an overview about the spatial data and its applications
- The course introduces the components and role of DBMS in GIS
- The course vivid the components of GNSS, GIS and its applications

UNIT – I SPATIAL AND NON- SPATIAL DATA:

Definition – nature – sources of spatial and non -spatial data – open-source data.

UNIT – II GLOBAL NAVIGATION SATELLITE SYSTEM:

Segments: space segment - GPS Satellite systems – New programmes – IRNSS - Control segment - Satellite tracking - User segment – Modern survey instruments – Error sources – Satellite augmented systems - DGPS - GNSS Applications.

UNIT – III GEOGRAPHICAL INFORMATION SYSTEM:

Definition – Historical development - Components of GIS: input device – data transformation – data storage and manipulation – data output device, Raster and vector data structures -. Comparison of raster and vector data.

UNIT – IV DBMS:C

Components - query - digitization – editing – topology – layout preparation

UNIT – V GIS ANALYSIS:

Single layer analysis: butter – interpolation, multilayer analysis: overlay analysis, network analysis, WebGIS (A Basic Introduction)

UNIT – VI CURRENT CONTOURS (For continuous internal assessment only):

Mobile mapping-location based services-Google API.

REFERENCES:

1. Gomarasca, M. A. (2009) Basics of Geometrics, Springer Science, New York
2. Lillisand T.M and R.W. Kiefer (1994) Remote Sensing and Image Interpretation. John Wiley & Sons, New York.
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6. Hofmann W., Lichtenegger, &Wasle, (2008).Global Navigational Satellite Systems, Springer Wien New York.
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8. Heywood, I., Comelius, S., and Carver, S., (1988). An Introduction to Geographical Information Systems, Addison Wiley Longmont, New York.

COURSE OUTCOMES:

On the completion of syllabus students must be able to:

- Understand the concept and types of spatial and non- spatial data
- Familiar on GIS components
- Discuss on GNSS principles and applications
- Find the insights of DBMS and its role in GIS
- Describe and attempt to perform GIS analysis

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