HWRM-308 INTRODUCTION TO REMOTE SENSING AND GIS (THEORY) (02 Credit hrs)

PRE-REQUISITE: GICT-201

LEARNING OUTCOMES:

- The course emphasizes on an integrative and interdisciplinary approach to spatial decision-making and problem solving, and gives an introduction to GIS in hydrology.
- The students will learn about different spatial data structures, data capture, analysis and map making.
- The students will be Introduced to the software (basic functions); Data acquisition; Alphanumerical information;
- They will conduct exercises on queries, selection; Coordinate systems, Geo referencing; Database design; Spatial analysis; Matrix models (DEM); Geographical Information Editing.
- The students will be equipped with various image processing techniques.

CONTENTS

Unit-1 Introduction:

1.1. Application of remote sensing in meteorology
1.2. Application of remote sensing in hydrology.
1.3. Sources of remoter sensing information.

Unit-II Aerial photographs and multispectral images

2.1. Characteristics of aerial photographs
2.2. Photomosaic phenomena
2.3. Stereo pairs its significance in water management
2.4. Black and White photographs, history, and development.
2.5. Advent of Color science

Unit-III: Land use and land cover analysis.

3.1. Manned satellite images, theory and importance
3.2. Gemini and Apollo mission's history and significance
3.3. Skylab, space shuttle, source of images.
3.4. Landsat images: satellite platforms and orbit patterns
3.5. Multispectral scanner system
3.6. Thematic mapper system

Unit-IV Landsat mosaics:

4.1. Interpretation methods in GIS/RS science.
4.2. Thermal infrared images, its characteristics and importance.
4.3. Thermal processes and their properties
4.4. Land use and Land cover analysis.

Unit-V Digital image processing:

5.1. Image structure
5.2. Image Processing
5.3. Image restoration and enhancement

5.4. Information extraction from imagery
5.5. Resource exploration for agriculture, irrigation system, snow cover and geology

Unit-VI: Environmental Application of GIS/RS

6.1. Environmental application of GIS/RS
6.2. Natural hazards applications,
6.3. Floods monitoring and Drought forecasting

ASSIGNMENTS – TYPE AND NUMBER WITH CALENDAR

It is continuous assessment. The weightage of Assignments will be 25% before and after midterm assessment. It includes:

- classroom participation,
- attendance, assignments and presentation,
- homework
- attitude and behavior,
- hands-on-activities,
- short tests, quizzes etc.

ASSESSMENT AND EXAMINATIONS

Sr. No.	Elements	Weightage	Details
1.	Mid Term Assessment	35%	It takes place at the mid-point of the semester
2.	Formative Assessment	25%	It is continuous assessment. It includes: classroom participation, attendance, assignments and presentation, homework, attitude and behavior, hands-on-activities, short tests, quizzes etc.
3.	Final Assessment	40%	It takes place at the end of the semester. It is mostly in the form of a test, but owing to the nature of the course the teacher may assess their students based on term paper, research proposal development, field work and report writing etc.

RECOMMENDED TEXT BOOKS / SUGGESTED READINGS

1. Brown, C. And Harder, C., (2016). *The ArcGIS Imagery Book*. Esri Press, Redlands, Califorinia.
2. Heywood, i., Cornelius, A. and Carver, S., (2006). *An introduction to Geographical Information Systems*. 3rd ed.Perason Education Limited.
3. Jansen, M., Judas, M.E. and Saborowski, J., (2002). *Spatial Modelling in Forest Ecology and management*- A Case Study. Springer 223.
4. Rao, D.P., (1998). *Remote Sensing for Earth Resources*, Association of Exploration Geophysicist, Hyderabad.
5. Zeiler, Michael, (1999). *Modeling Our World*: The ESRI Guide to Geodatabase Design. ESRI Press, 216 pp.

HWRM-308 INTRODUCTION TO REMOTE SENSING AND GIS (LAB) (01 Credit hr)

PRE-REQUISITE: GICT-201

LEARNING OUTCOMES:

- The practical exercises will cover classical cartographic concepts, as well as modern concepts of digital GIS.
- The course emphasizes on an integrative and interdisciplinary approach to spatial decision-making and problem solving, and gives an introduction to GIS in hydrology.
- The students will learn about different spatial data structures, data capture, analysis and map making.
- The students will be Introduced to the software (basic functions); Data acquisition; Alphanumerical information;
- They will conduct exercises on queries, selection; Coordinate systems, Geo referencing; Database design; Spatial analysis; Matrix models (DEM); Geographical Information Editing.

CONTENTS

Unit-I

1.1 To acquaint the students, with the understanding of methods of GIS and remote sensing.

Unit-II

2.1 Introduction to ArcGIS and QGIS.

Unit-III

3.1 Use of ERDAS-Imagine software for water data analysis.

Unit-IV

4.1 Coupling of GIS with Surface/Groundwater Models.

Unit-V

5.1 Hands on exercises on data analysis and image analysis using different software's.

Unit-VI

6.1 Field Visit to SUPARCO and other allied departments

ASSIGNMENTS – TYPE AND NUMBER WITH CALENDAR

It is continuous assessment. The weightage of Assignments will be 25% before and after midterm assessment. It includes:

- classroom participation,
- attendance, assignments and presentation,
- homework
- attitude and behavior,
- hands-on-activities,
- short tests, quizzes etc.

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