

GIS – 834 Hydrology and Water Resources (3+0=3)

1. **Course Objectives:**

- a. To enable students to understand the principles of integrated water resource planning and management using modern geospatial techniques.

2. **Course Outcomes:**

- a. At the end of this course the student will be able to understand surface/sub-surface hydrological processes and water management issues.

3. **Course Code:**

- a. GIS – 838

4. **Credit Hours:**

- a. Theory = 03
- b. Practical = 00
- c. Total = 03

5. **Detailed Contents:**

- a. Basic Definitions, Historical Background, The Hydrologic Cycle
- b. Precipitation
- c. Evaporation and Transpiration
- d. Infiltration, and Recharge
- e. Basic Groundwater Hydrology and Systems
- f. Surface Runoff and Stream Flow
- g. Water Quality
- h. Surface Water Resource Systems, Rivers, Lakes, and Reservoirs
- i. Water treatment systems
- j. Hydrology for water excess management
- k. Water scarcity – droughts/types of droughts; Assessing and modeling droughts using GIS
- l. Snow and Glacier Hydrology (mountainous hydrology)
- m. Application of GIS in Hydrological modeling system

n. GIS Case Studies in Hydrology and Water Resources

6. Detail of Lab work, workshop practice, if applicable:

- a. Watershed delineation
- b. ArcHydro
- c. Term Project

7. Textbooks/Reference Books:

- a. Serrano, S. E. (1997), Hydrology for engineers, geologists, and environmental professionals. Hydroscience, Inc., KY, 451p, ISBN: 0965564398.
- b. Shamsi, U.M. GIS Applications for water, wastewater, and stormwater systems. Taylor and Francis, CRC Press, 413p, ISBN: 0849320976.
- c. Heath, Ralph C., 1983. Basic Ground-Water Hydrology, US Geological Survey Water Supply Paper-2220, USA, 86p.
- d. Deming, D., 1954, Introduction to Hydrogeology. McGraw-Hill, 468p, ISBN: 0072326220.
- e. Grigg, N. S., (1996), Water Resources Management: Principles, Regulations, and Cases, McGraw-Hill Professional, ISBN: 007024782X.
- f. Lyon, J., (2003), GIS for Water Resources and Watershed Management, CRC Press, ISBN: 0415286077.
- g. Mays, L. W., (1996), Water Resources Handbook, McGraw-Hill Professional, ISBN: 0070411506.
- h. Dunne, T. & Leopold, L. B., (1978), Water in Environmental Planning. Freeman & Co. 818p, ISBN: 0716700794.
- i. Pinder, G. F., (2002), Groundwater modeling using geographic information systems. John Wiley & Sons, NY, 231p, ISBN: 0471084980.