GIS – 826 Advanced Geodatabase and Programming (2+1=3)

1. **Course Objectives:**
   a. To enable students to develop a basic and advanced understanding of databases and programming.

2. **Course Outcomes:**
   a. It is expected that students will have a good understanding of theoretical as well as practical components of databases, programming, and spatial data warehouse & mining.

3. **Course Code:**
   a. GIS – 826

4. **Credit Hours:**
   a. Theory = 02
   b. Practical = 01
   c. Total = 03

5. **Detailed Contents:**
   a. Understanding Relational Database Management System
   b. Database Design and ER diagrams
   c. Database Normalization
   d. ESRI Geodatabase
   e. Spatial databases Concepts
   f. History and introduction of programming languages
   g. Understanding Programming Logic (Pseudo Codes and Flow Charts)
   h. Python basics concepts
   i. GIS Programming using Python
   j. ArcObjects/ArcGIS Server
   k. OLAP vs. OLTP, Spatial Data warehouse and data mart Fundamentals, Dimensional Modeling
   l. Strategies for Extracting Transforming and Loading (ETL)
   m. OLAP SQL Queries, Spatial data Mining techniques
   n. OLAP vs. OLTP
   o. Spatial Data Warehouse and Data Mart
   p. Extracting Transforming and Loading (ETL)
   q. Spatial Data Mining

6. **Detail of Lab work, workshop practice, if applicable:**
   a. Pseudocodes
   b. Flowcharts
   c. Basic Arithmetic Operations in Python
   d. Strings in Python
   e. Integers and Floating Points in Python
   f. Lists, Tuples, and Dictionaries
   g. Modules in Pythons
   h. Python in ArcGIS
   i. Database in MS-Access
   j. Spatial Database using PostGIS and Oracle Spatial
   k. ArcGIS Desktop, ArcGIS Server
   l. Geodatabase (personal and enterprise)

7. **Textbooks/Reference Books:**

a. Westra, E. 2010, Python Geospatial Development. Packt Publishing Ltd.
b. Harvey J. Miller, Jiawei Han 2009, Geographic Data Mining and Knowledge Discovery.
c. Philippe Rigaux, et al (2002) Spatial Databases: With Application to GIS Morgan Kaufmann Series in Data Management Systems) Academic Press, U. S.
d. Building GeoDatabase by ESRI.
e. GeoDatabase Workbook by ESRI.
f. Related Journal Papers (Class handouts)