CIP Code: 45.0702

METROPOLITAN STATE COLLEGE OF DENVER
Office of Academic Affairs

REGULAR COURSE SYLLABUS

School of Letters, Arts & Sciences

Department: Earth and Atmospheric Sciences

Semester(s) Offered: __Spring__

Prefix & Course Number: GIS 4870 **Crosslisted With*: N/A**

Course Title: Spatial Databases

Credit Hours: 3 (2 +2)

Contact Hours: Lecture 30 Lab 30 Internship _____ Practicum _____

Schedule Type(s): B **Grading Mode(s)**: L

Repeat* (Variable topics): N/A
*(Pertinent only if the course can be repeated; enter maximum number of hours that can be earned by taking this course.)
Restrictions (Variable Topics Course): N/A

Prerequisite(s): GIS 4860
C or better in prerequisite courses
Upper division standing
Or permission of instructor

Corequisite(s): N/A

Prerequisite(s) or Corequisite(s): N/A

Catalog Course Description: This upper-division course emphasizes the challenges and uniqueness of spatial data organization from specific database models to national spatial data infrastructures. Students will gain theoretical and practical experience designing, implementing, and managing georelational and object-relational databases for planning and natural resource applications. Practical experience in spatial database creation using Global Positioning Systems (GPS), Database Management Systems (DBMS) and Geographic Information Systems (GIS) will be stressed.

Required Reading and Other Materials will be equivalent to (Title, Author, Publisher, Copyright Date):
Database Concepts, 2nd Edition, David M. Kroenke, Pearson/Prentice Hall, Upper Saddle River, NJ, 2005

Modeling Our World, Michael Zeiler, Environmental Research Systems Incorporated, 1999

Data Analysis for Database Design, 3rd Edition, David Howe, Butterworth-Heinemann, 2001

Specific (Measurable) Student Behavioral Learning Objectives:

APPROVED:

Department Chair/Institute Director	Date
Dean	Date
Associate VP, Academic Affairs	Date

*If crosslisted, attach completed Course Crosslisting Agreement Form

Prefix and Course Number: GIS 4870____

Concepts

Upon completion of this course the student should be able to:

1. Explain spatial data organization structures at various spatial scales.
2. Create conceptual models of data using top down and bottom up approaches
3. Translate conceptual models to logical and physical data models using GIS database software
4. Discern differences between database structures of georelational versus object-relational databases in a GIS
5. Determine database and spatial data requirements for a project
6. Normalize databases
7. Create and query databases using structured query language (SQL)
8. Collect spatial data with global positioning systems (GPS) and import it into a GIS
9. Utilize georelational and object-relational databases with a GIS (ArcGIS or current equivalent)
10. Design and create georelational and object-relational databases to meet spatial project requirements

Detailed Outline Of Course Content (Major Topics and Subtopics) **or Outline Of Field Experience/Internship** (experience, responsibilities and supervision):

1. Spatial Databases Introduction
   1.1. Properties of spatial databases
   1.2. Relationship between spatial databases and GIS
   1.3. Data types
   1.4. Metadata
   1.5. Attributes

2. Databases versus database management systems
   2.1. Data independence
   2.2. Data structuring, validation and recovery, monitoring
   2.3. Distributed databases

3. Database management system architecture
   3.1. Conceptual model
   3.2. Logical model
   3.3. Physical model

4. Database design approaches
   4.1. Top down – Entity-relationship (ER) models first
   4.2. Bottom up – ER models last

5. Normalization
   5.1. Redundant versus duplicated data
   5.2. Determinants and identifiers
   5.3. Well-normalized tables

6. ER modeling
   6.1. Relationship types
   6.2. Degree of relationship

7. Entity-relationship diagrams

8. Relational databases

9. Tables

10. Data query
    10.1. Query optimization
    10.2. Structured Query Language

11. Data models for spatial and non-spatial data
    11.1. Relational model
    11.2. Georelational model
    11.3. Object model
    11.4. Object-relational model

12. Unified modeling language(UML)

13. Web databases processing

14. Distributed databases

15. Geodatabases
    15.1. Structure
    15.2. Capabilities
    15.3. Models

Evaluation Of Student Performance:

Exams and Quizzes
Homework and Labs
Class Participation