Miami Dade College

**Course Description**

**GIS2046 | Advanced GIS Technology | 4.00 credits**

This course teaches advanced concepts of Geographic Information Systems (GIS). The student will learn how to use vector, raster and 3D data, geospatial structures, and write GIS functions using a programming language. At the end of the course, the student will be able to perform advanced operations in GIS software. Prerequisite: GIS 2045.

**Course Competencies**

**Competency 1:** The student will demonstrate an understanding of moving data into and out of Post GIS by:

1. Importing nonspatial tabular data (CSV)
2. Importing and exporting shapefiles
3. Handling batch importing and exporting of datasets
4. Exporting data to shapefile
5. Importing and exporting OpenStreetMap data
6. Importing and exporting Raster data
7. Importing and exporting multiple Raster data

**Competency 2:** The student will demonstrate an understanding of using geospatial structures by:

1. Using geospatial views
2. Using triggers to populate the geometry column
3. Structuring spatial data with table inheritance
4. Extending inheritance and table partitioning
5. Normalizing imports
6. Normalizing internal overlays
7. Using polygon overlays for proportional census estimates

**Competency 3:** The student will demonstrate an understanding of vector data by:

1. Improving proximity filtering
2. Rotating geometries
3. Detailing building footprints from LiDAR
4. Creating a fixed number of clusters from a set of points
5. Calculating diagrams

**Competency 4:** The student will demonstrate an understanding of raster data by:

1. Performing simple map algebra operations
2. Combining geometries with rasters for analysis
3. Converting between rasters and geometries
4. Processing and loading rasters
5. Warping and resampling rasters
6. Executing DEM operations
7. Sharing and visualizing rasters through SQL

**Competency 5:** The student will demonstrate an understanding of working with routing by:

1. Calculating the driving distance/service area
2. Calculating the driving distance with demographics
3. Extracting the centerline of polygons
4. Loading data from OpenStreetMap and finding the shortest path

**Competency 6:** The student will demonstrate an understanding of LiDAR point cloud data by:

1. Extruding building footprints
2. Creating arbitrary 3D objects
3. Reconstructing Unmanned Aerial Vehicle (UAV) image footprints

4. Analyzing UAV photogrammetry – point cloud/DMS creation

**Competency 7:** The student will demonstrate an understanding of GIS programming by:

1. Writing GIS functions using Python
2. Geocoding and reverse geocoding using GeoNames datasets
3. Geocoding with Python
4. Importing datasets with Python

**Competency 8:** The student will demonstrate an understanding of GIS maintenance, optimization, and performance tuning by:

1. Organizing a database
2. Setting up correct data privilege mechanism
3. Backing up a database
4. Using indexes
5. Optimizing SQL queries
6. Sharing geospatial databases

**Learning Outcomes:**

- Use quantitative analytical skills to evaluate and process numerical data
- Use computer and emerging technologies effectively