

Bishop Dunne Catholic School

Geographic Information Systems III—10th – 12th Grade

Curriculum Guide (revised February 2006)

Course Description:

Geographic Information Systems (GIS) is mapping software linked to databases that produce maps automatically to answer questions. Students learn geographic concepts and the use of GIS software by completing mapping simulation exercises.

In GIS 3 students will build on skills acquired in earlier courses by better understanding the administration and organization of a GIS system. As students build actual GIS projects they will be expected such things as: acquiring primary data, establishing the framework of the geodatabase storage system and establishing standards for product output.

Created maps are placed in a personal portfolio that may be presented to college admissions counselors and prospective employers. Skills learned include: basic cartography (mapping), Global Positioning Systems (GPS), graphic layout and 3D terrain modeling. Off-campus field data collection is a component of this course. Grade level: 10-12. Semester course.

Quarter Grade:

50% Informal Map Projects (Daily Grades)

50% Formal Map Project or Lab Practical

Course Goals for the Semester

The primary goal of this course is to teach students the basics of GIS. Students should be able to do the following by the time they complete this course:

- Understand what GIS is and how it is used in the world.
- Be able to manage data for a GIS system.
- Understand the theory behind a GIS system.
- Learn GIS skills and concepts that will allow them to solve problem in the real world.
- Generate a Portfolio
- Generate Posters for Competition

| Unit | Skills | TEKS | NETS | Assessments |
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| UNIT 1 – Steps of Strategic Planning <ul style="list-style-type: none"> • Overview of the steps <ul style="list-style-type: none"> ○ Strategic Purpose ○ Plan for the planning ○ Conduct a technology seminar ○ Describe the | 1. Steps for planning a GIS system | 1A 1B 1C 1D 2B 3B 4C 9A 9B | 1.2 2.2 3.1 4.1 5.2 6.1 | Portfolio Project 1-Strategic Plan Lab Practical 1 |

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| <ul style="list-style-type: none"> ○ information products <ul style="list-style-type: none"> ○ System scope ○ Data design ○ Logical data model ○ Determine system requirements ○ Benefit cost analysis ○ Implementation Plan • Apply the steps to a project from GIS 1 or 2 | | | | |
| <p>UNIT 2 – Project Planning to Output (Karst)</p> <ul style="list-style-type: none"> • History of the Karst Project (TXU) • GIS planning stages 1-5 for the Karst Project • Data Acquisition <ul style="list-style-type: none"> ○ Download data ○ Unzip ○ Storage (temp) • Data formatting and Storage <ul style="list-style-type: none"> ○ Process the data table ○ Generate a data storage structure <ul style="list-style-type: none"> ▪ Lecture: Making data map ready • Image Processing <ul style="list-style-type: none"> ○ Image registration • Digitizing • Metadata <ul style="list-style-type: none"> ○ Archive the Project Generated metadata files for all newly created data <ul style="list-style-type: none"> ▪ Lecture: Why Metadata is a must • Product Output <ul style="list-style-type: none"> ▪ Establish layout standards and final file format standards | <ol style="list-style-type: none"> 1. Utilize planning stages 2. Unzip 3. File Management 4. Setting control points 5. Image Georeferencing 6. Digitize editing 7. Creating Metadata 8. Setting up an Archive 9. | 1D 5A 7B 7E 9A 9C 12C | 1.2 2.2 3.1 4.2 5.3 | Portfolio Project 2-Karst Project with System Planning analysis Lab Practical 2 |

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| <ul style="list-style-type: none"> ○ Generate final products <ul style="list-style-type: none"> ▪ Lecture: Layout polishing ▪ Lecture: 1 product many formats • Project Archiving <ul style="list-style-type: none"> ○ Set relative path ○ Export project into archive storage location ○ Clear a version of the project and save a template. <ul style="list-style-type: none"> ▪ Lecture: Protecting your Archive | | | | |
| <p>Unit 3 – GIS / GPS Integration (Search and Rescue)</p> <p>Lecture: History and goal of the BD SAR Program</p> <ul style="list-style-type: none"> • SAR Review <ul style="list-style-type: none"> ○ Taking Tracks and Marking Waypoints ○ Downloading from the GPS ○ Building a basic SAR project ○ 3D model flight ○ Constructing UTM grid referencing systems ○ POA and POD Excel spreadsheets ○ Reprojecting data ○ Zeroing out a GPS/advanced settings ○ Uploading GPS img files ○ Trimble Mission Planning Software <ul style="list-style-type: none"> ▪ Lecture: SAR Leadership role • Region 3 Park Assignments <ul style="list-style-type: none"> ○ Locating your assigned park • Strategic Plan (Skelton) <ul style="list-style-type: none"> ○ Work through the planning steps and gain approval from the instructor. <ul style="list-style-type: none"> ▪ Lecture: Learning from the first park projects • Obtain primary Data <ul style="list-style-type: none"> ○ Download data ○ Unzip and temp process ○ Contact the region 3 resource | <p>Non Reviewed skills</p> <ol style="list-style-type: none"> 1. Write a Project Strategic plan 2. Creating GPS background maps 3. Generating Grid layers 4. Buffering 5. Layer conversion Polygon to point 6. Advanced labeling table setup 7. | <p>2A 4A 5B 6A 6B 7A 7C 7F 8A 8B 8C 8D 8E 9B 10A 11A 12A 12B 12C</p> | <p>1.1 3.1 4.2 5.1 5.2 5.3 6.2</p> | <p>Formal SAR Project for a State Park</p> <p>SAR Skill Lab Practical</p> |

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| <p>manager</p> <ul style="list-style-type: none"> • Setup data storage <ul style="list-style-type: none"> ○ Folder Structure ○ Unpack and process all data (reproject if necessary) • New Data <ul style="list-style-type: none"> ○ Digitize layers ○ Edit Tools Extension (grid network) ○ Generated grids ○ Format for labels ○ GPS upload files ○ Place in file structure ○ Generate needed Metadata • Product Output <ul style="list-style-type: none"> ○ 2D project ○ 3D Project ○ Burn to CD or DVD (relative Path) ○ Pre-format layouts ○ Additional products (powerpoint) <ul style="list-style-type: none"> ▪ Lecture: What your final project should look like <p>Portfolio Project 3-State Park SAR CD</p> <p>Lab Practical 3-Mock Search SAR Cert. Exam-Cedar Hill State Park</p> | | | | |
| <p>UNIT 4 – Model Builder Tutorial (DVSP Fire Model)</p> <p>Lecture: Reasons for Fire Modeling</p> <ul style="list-style-type: none"> • Base Layer Data <ul style="list-style-type: none"> ○ Study base layer data ○ Locations of base layer data ○ Processing the DEM • Using Model Builder <ul style="list-style-type: none"> ○ Starting model <ul style="list-style-type: none"> ▪ Lecture: Model Builder Introduction • Generating and Scoring the Surface <ul style="list-style-type: none"> ○ Running the model <ul style="list-style-type: none"> ▪ Lecture: Slope vs. Aspect vs. Veg. | <p>1. DEM Downloading</p> <p>2. Model Building</p> | <p>4A</p> <p>4B</p> <p>4C</p> <p>6B</p> <p>7A</p> <p>7C</p> <p>7D</p> <p>7E</p> <p>7F</p> <p>8A</p> <p>9B</p> <p>11C</p> <p>12D</p> | <p>1.2</p> <p>3.1</p> <p>4.2</p> <p>5.2</p> <p>6.1</p> | <p>Portfolio Project</p> <p>4-DVSP model</p> <p>Lab Practical4</p> |

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| <ul style="list-style-type: none"> • Final Product <ul style="list-style-type: none"> ○ Poster Requirements ○ Powerpoint progressive slide technique <ul style="list-style-type: none"> ▪ Lecture: How a Burn is Conducted | | | | |
| <p>UNIT 5 – Site Selection Analysis (Locating a Business)</p> <ul style="list-style-type: none"> • Strategic Plan (Skelton) Work through the planning steps for generating a GIS project that will help to locate a business in a new or better location. A city and a Business should be revealed at the start of the plan. • Obtain primary Data <ul style="list-style-type: none"> ○ Download data ○ Unzip and temp process ○ Yahoo yellow pages (format into table) ○ Census ○ USGS Seamless • Setup data storage <ul style="list-style-type: none"> ○ Folder Structure ○ Unpack and process all data (reproject if necessary) • Process data <ul style="list-style-type: none"> ○ Add event theme or geocode ○ Reproject if necessary • Establishment judgment criteria <ul style="list-style-type: none"> ○ Income level ○ Target customer ○ Freeway Buffer ○ Proximity to similar shops • Analyze the Data <ul style="list-style-type: none"> ○ Generate Spatial Analyst Grids ○ Generate Buffers ○ Build Census maps ○ Generate a scoring grid ○ Metadata • Product Output <ul style="list-style-type: none"> ○ Map and Report | <ol style="list-style-type: none"> 1. Advanced data table reformatting 2. Geocode table data 3. Advanced location analysis | 3A 6B 7B 7C 7E 9B 10A 10B 11A 11B | 1.1 2.2 4.1 4.2 5.1 6.1 | Business Location Project Lab Practical |
| <p>UNIT 7 –3D Modeling (Tsunami mapping)</p> <ul style="list-style-type: none"> • Strategic Plan (Skelton) | <ol style="list-style-type: none"> 1. Changing data format 2. Hotspot Grid analysis | 4A 7C 7F 9B | 2.2 4.2 5.1 5.2 | Tsunami Map Lab Practical 7 |

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| <p>Work through the planning steps for generating a GIS project that will show the fault location of the Asian Tsunami and the sea level rise in nearby islands.</p> <ul style="list-style-type: none"> • Obtain primary Data <ul style="list-style-type: none"> ○ Download data ○ Unzip and temp process ○ Tectonic websites • Setup data storage <ul style="list-style-type: none"> ○ Folder Structure ○ Unpack and process all data (reproject if necessary) • Process data <ul style="list-style-type: none"> ○ Add event theme • Display and analyze data <ul style="list-style-type: none"> ○ Generate Spatial Analyst Hotspot Grids ○ 3D base height plot of Earthquake locations ○ Satellite images of islands ○ Sea level rise polygons • Product Output <ul style="list-style-type: none"> ○ Poster with 3D and 2D map displays | | 10A 12C | 6.1 | |
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