SAULT COLLEGE OF APPLIED ARTS AND TECHNOLOGY

SAULT STE. MARIE, ONTARIO

SAULT COLLEGE

COURSE OUTLINE

COURSE TITLE: GIS Applications

CODE NO. :   GIS423   **SEMESTER:**   11W

PROGRAM: Geographic Information Systems Applications Specialist

AUTHOR: Heath Bishop

DATE: May, 2010   **PREVIOUS OUTLINE DATED:**   Dec., 2009

APPROVED: "B. Punch"

_____   _____
                          CHAIR   **DATE**

TOTAL CREDITS: 4

PREREQUISITE(S):   GIS417

HOURS/WEEK: 4

I. COURSE DESCRIPTION:

This course is designed to put into practice many of the skills the student gained in the prerequisite GIS417 course. The primary software for the course is ArcGIS as well as many of its extensions. The course will explore extensions such as spatial analyst, 3D analyst and network analyst.
A growing area of GIS is dealing with the Health sector. A portion of this course will deal with Health GIS and explore some of the rapidly developing advancements in Health Informatics.

II. LEARNING OUTCOMES AND ELEMENTS OF THE PERFORMANCE:

Upon successful completion of this course, the student will demonstrate the ability to:

1. Develop GIS applications using a Geodatabase

    Potential Elements of the Performance:
    - Describe and design a Geodatabase
    - Construct and edit a Geodatabase using ArcCatalog
    - Explore the relational database behind a Geodatabase
    - Understand the geometry inherent in a Geodatabase
    - Import and export other GIS formats to a Geodatabase

2. Perform raster GIS analysis

    Potential Elements of the Performance:
    - Use the ArcGIS Spatial Analyst extension
    - Describe the sources, formats, data types and structures of raster GIS data
    - Describe potential raster GIS analyses
    - Use Map Algebra to perform complex spatial analyses
    - Ability to use Model Builder for spatial modeling / analysis
    - Exposure to the geostatistical analyst extension

3. Perform 3-Dimensional Analysis

    Potential Elements of the Performance:
    - Use the ArcGIS 3-D Analyst extension
    - Describe TIN and Lattice data structures, data sources and surface

concepts
- Perform slope, aspect, analytical hillshading, visibility and surface profiling analyses
- Perform 3-D surface area and volumetric analyses

4.   Perform Network Analysis

Potential Elements of the Performance:
- Use the ArcGIS Network Analyst extension
- Describe network analysis theory
- Perform network analysis (e.g., fastest route, service areas)

5.   Health GIS

Potential Elements of the Performance:
- Look into the rapidly growing field of how GIS can be applied to the Health sector
- Study the theory and practical applications in this area

III.   TOPICS:

1.   Geodatabases
- Geodatabase theory
- Designing a Geodatabase
- Geodatabase geometry and topology
- Relational databases and geodatabases
- Coverage, shapefile and projection import and export

2.   Raster GIS Analysis
- Raster GIS theory
- Map algebra and spatial modeling
- Topographic analysis
- Density rasters
- Model Builder
- Surface hydrology tools (flow direction and accumulation, basin and stream delineation)
- Creating a raster, importing and exporting rasters
- ArcGIS Spatial Analyst and Geostatistical analyst extensions

3.   3-Dimensional Analysis
- Triangular irregular network (TIN) theory
- ArcGIS 3-D analyst extension
- Creating a TIN, importing and exporting elevation data
- Elevation and viewshed modeling

- Surface profiling
- Creating lake bathymetry surfaces

4. Network analysis
   - ArcGIS Network Analyst Extension
   - Network analysis Perform network analysis (e.g., fastest route, service areas)

5. Health GIS
   - Examine how GIS is being applied in the health field
   - Look into epidemiology and how it can be mapped
   - Perform health GIS studies on a community/regional scale

IV.   REQUIRED RESOURCES/TEXTS/MATERIALS:

Price, M. 2009. Mastering ARCGIS, Fourth Edition. McGraw-Hill.

V.   EVALUATION PROCESS/GRADING SYSTEM:

Labs	50%
Tests (2)	50%
Total	100%

Note: Students must achieve a mark of at least 50% on the Test components to pass the course.

The following semester grades will be assigned to students:

Grade	Definition	Grade Point Equivalent
A+	90 – 100%	4.00
A	80 – 89%	
B	70 - 79%	3.00
C	60 - 69%	2.00
D	50 – 59%	1.00
F (Fail)	49% and below	0.00
CR (Credit)	Credit for diploma requirements has been awarded.	
S	Satisfactory achievement in field /clinical placement or non-graded subject area.	
U	Unsatisfactory achievement in	

	field/clinical placement or non-graded subject area.
X	A temporary grade limited to situations with extenuating circumstances giving a student additional time to complete the requirements for a course.
NR	Grade not reported to Registrar's office.
W	Student has withdrawn from the course without academic penalty.

VI.   SPECIAL NOTES:

Attendance:
Sault College is committed to student success. There is a direct correlation between academic performance and class attendance; therefore, for the benefit of all its constituents, all students are encouraged to attend all of their scheduled learning and evaluation sessions. This implies arriving on time and remaining for the duration of the scheduled session.

VI.   COURSE OUTLINE ADDENDUM:

The provisions contained in the addendum located on the portal form part of this course outline.