# SAULT COLLEGE OF APPLIED ARTS AND TECHNOLOGY

# SAULT STE. MARIE, ONTARIO



SAULT COLLEGE

# COURSE OUTLINE

**COURSE TITLE:**    GIS Applications

**CODE NO. :**    GIS423    **SEMESTER:**    12W

**PROGRAM:**    Geographic Information Systems Applications Specialist

**AUTHOR:**    Heath Bishop

**DATE:**    Jan, 2012    **PREVIOUS OUTLINE DATED:**    Dec, 2010

**APPROVED:**

"B.Punch"

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                                **CHAIR**                                           **DATE**

**TOTAL CREDITS:**    4

**PREREQUISITE(S):**    GIS426

**HOURS/WEEK:**    4

## I.    COURSE DESCRIPTION:

This course is designed to introduce students to extended functionality in ArcGIS.  The course will explore concepts such as geodatabases and geocoding as well as extensions such as spatial analyst, 3D analyst and network analyst.  Also, due to the growth of the Health sector in GIS, 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:
      - Basic Geodatabase concepts and functionality
      - Geodatabase Topology Rules and validation

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.    Perform Geocoding

Potential Elements of the Performance:
- Understand the concepts involved with geocoding
- Create  Address Locators
- Perform geocoding

6.    Understand Health GIS

Potential Elements of the Performance:
- Look into the rapidly growing field of how GIS can be applied to the Health sector
- Understand 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.   Geocoding
- Address locators
- Geocoding process

6.   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  (9) | 50% |
| Tests (2) | <u>50%</u> |
| Total | 100% |

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

Note: All assignments are due at the beginning of class on the scheduled due date, or will be subject to a 10% penalty.  Each subsequent day that the assignment is not handed in by 8:30am is an additional 10% deduction.

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.

Course Outline:
The Professor reserves the right to change the information contained in this course outline depending on the needs of the learner and the availability of resources.

## VI.    COURSE OUTLINE ADDENDUM:

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