

SAULT COLLEGE OF APPLIED ARTS AND TECHNOLOGY

SAULT STE. MARIE, ONTARIO



COURSE OUTLINE

COURSE TITLE: Introduction to Geographic Information Systems
CODE NO. : GIS421 **SEMESTER:** 10F
PROGRAM: Geographic Information Systems Applications Specialist
AUTHOR: Heath Bishop
DATE: May, 2010 **PREVIOUS OUTLINE DATED:** Aug., 2009

APPROVED:

“B. Punch”

CHAIR

DATE

TOTAL CREDITS: 3

PREREQUISITE(S): None

HOURS/WEEK: 5

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I. COURSE DESCRIPTION:

Geographic Information Systems (GIS) provide decision-making data and maps in a variety of industries. Through lectures, student seminars/projects and hands-on experience, the student will gain an understanding of GIS theory and practical working ability in the ArcView 3.3 and ArcINFO Workstation environments. Theory topics to be covered include: GIS fundamentals, cartography, projection, data models, data quality issues, and GIS data analysis. Practical GIS topics include: file management, querying spatial data, working with tabular data, spatial analysis, creating and editing data, working with projected data and creating professional quality maps.

II. LEARNING OUTCOMES AND ELEMENTS OF THE PERFORMANCE:

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

1. Describe current and historical Geographic Information Systems (GIS) and their components

Potential Elements of the Performance:

- Describe current GIS, their uses and components
- Describe the history of cartography and GIS
- Explain the generalized GIS process
- Understand various applications of GIS

2. Describe the fundamentals of cartography

Potential Elements of the Performance:

- Describe the elements of good map design
- Explain the use of colour and element positioning in cartography

3. Create and modify ArcView projects

Potential Elements of the Performance:

- Work with ArcView projects
- Modify views and tables and create layouts
- Save data as shapefiles
- Practice good file management

- Query data to answer questions

4. Describe Coordinate Systems and Map Projections

Potential Elements of the Performance:

- Describe the use of different Earth models (datums)
- Understand coordinate systems and map projections as they apply to GIS

5. Describe GIS data models

Potential Elements of the Performance:

- Describe how features are organized and displayed in a GIS
- Explain raster, vector and other spatial data models
- Describe the role and types of relational databases used in GIS

6. Describe data analysis methods in GIS

Potential Elements of the Performance:

- Describe the various levels of GIS analysis
- Explain the integration of attribute data, map overlays, queries, buffers, intersections and unions
- Perform spatial analysis of GIS data

7. Produce high-quality maps, charts, and reports

Potential Elements of the Performance:

- Add attributes and external databases to ArcView tables
- Create charts and reports
- Add graticules, scales, legends and north arrows to layouts
- Work with external GIS and remote sensing data

8. Explain methods of GIS data input, and issues regarding data quality and errors

Potential Elements of the Performance:

- Describe the collection, input and output of GIS data
- Explain the importance of precision and accuracy in a GIS
- Describe sources of positional and data accuracy error in a GIS
- Describe spatial and temporal variations in earth surface features and the nature of boundaries
- Understand and apply proper shapefile management in ArcView

- Ability to digitize Earth surface features in ArcView
- Understand the applications of event themes

III. TOPICS:

1. History, Components and Capabilities of Geographic Information Systems
 - History of GIS development and current GIS software
 - GIS system components, capabilities and trends
 - The GIS process
 - Applications of GIS analyses
2. Cartography
 - Map purpose, design, concepts and components
 - Cartographic use of shapes and colours

The map production process
3. ArcView Projects
 - Projects, views, tables and layouts
 - Shapefiles
 - ArcView file management
 - Querying data
4. The shape of the earth
 - Datums
 - Coordinate systems
 - Map projections
5. GIS Data Models
 - Vector, raster, DEM, TIN, and object-oriented GIS models
 - Topology
 - Data Storage
 - Relational databases
 - Attribute tables
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6. Data Analysis
 - Levels of analysis
 - Integration of attribute data
 - Map overlays and queries
 - Buffering
 - Spatial analysis in ArcView

7. Producing Maps, Tables and Charts
 - Presenting analysis results
 - Creating charts and reports
 - Adding graticules, scales, legends and north arrows to layouts

8. Data Input, Quality and Errors
 - Collection and input of GIS data
 - Precision and accuracy
 - Data quality issues / sources and types of GIS errors
 - Natural variations in Earth-surface features (boundaries)
 - Changes with time in Earth-surface features (temporal changes)
 - Managing Shapefiles
 - Digitizing in ArcView
 - Event themes

IV. REQUIRED RESOURCES/TEXTS/MATERIALS:

ESRI. 1997. Understanding GIS, The ARC/INFO Method. Version 7.1 for UNIX and Windows NT. Cambridge, Environmental Systems Research Institute, Inc. *(will be provided)*

V. EVALUATION PROCESS/GRADING SYSTEM:

Assignments (8)	55%
Tests	40%
Report	<u>5%</u>
	100%

Note: Students must achieve an overall mark of at least 50% on the Test/Exam components to pass the course.

The following semester grades will be assigned to students:

<u>Grade</u>	<u>Definition</u>	<u>Grade Point Equivalent</u>
A+	90 – 100%	4.00
A	80 – 89%	3.00
B	70 - 79%	2.00
C	60 - 69%	1.00
D	50 – 59%	0.00
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.