

SAULT COLLEGE OF APPLIED ARTS AND TECHNOLOGY

SAULT STE. MARIE, ONTARIO



Sault College

COURSE OUTLINE

COURSE TITLE: Introduction to GIS

CODE NO. : GIS 4190 **SEMESTER:** F2002

PROGRAM: Geographic Information Systems Applications Specialist

AUTHOR: Dennis Paradine

DATE: April, 2002 **PREVIOUS OUTLINE DATED:** June, 2001

APPROVED:

_____	DEAN	_____	DATE
-------	------	-------	------

TOTAL CREDITS: 3

PREREQUISITE(S): None

LENGTH OF COURSE: 6 hrs/wk x
7 wks **TOTAL CREDIT HOURS:** 40

Copyright ©1998 The Sault College of Applied Arts & Technology
Reproduction of this document by any means, in whole or in part, without prior written permission of Sault College of Applied Arts & Technology is prohibited.
For additional information, please contact Kitty DeRosario, Dean
School of Engineering, Technology and Trades
(705) 759-2554, Ext. 642

Course Name

Code No.**I. COURSE DESCRIPTION:**

Geographic Information Systems (GIS) provide decision-making data and maps in the natural resources, planning and urban services fields. 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 environment. Theory topics to be covered include: GIS fundamentals, cartography, projection, data models, programming, data quality issues, and GIS data analysis and modeling. ArcView topics include: projects, views, tables, layouts and data import and conversion.

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

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
- Outline the stages of map production
- Describe the use of different Earth models (datums), coordinate systems and map projections in GIS

3. Describe GIS data models

Potential Elements of the Performance:

- Describe how features are organized and displayed in a GIS
- Describe the collection, input and output of GIS data
- Explain raster, vector and object-oriented data models
- Describe the role and types of relational databases used in GIS
- Describe the role of programming in GIS

4. Explain GIS data quality issues

Potential Elements of the Performance:

- 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

5. Describe data analysis and modeling methods

Potential Elements of the Performance:

- Explain the integration of attribute data, map overlays, queries, buffers, intersections and unions
- Describe the role of classification and interpolation
- Understand 3-D, raster, network and regional analyses

6. Create and modify ArcView projects

Potential Elements of the Performance:

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

7. Produce high-quality ArcView maps, tables and charts

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 different projections
- Digitize Earth surface features
- Work with external GIS, GPS and remote sensing data

8. Explore ArcView extensions

Potential Elements of the Performance:

- Use the geoprocessing wizard, 3-D Analyst and Spatial Analyst extensions to perform GIS operations
- Read CAD (Computer Aided Design) files
- Use the Network Analyst extension to perform business geographic analyses

III. TOPICS:

1. History, Components and Capabilities of Geographic Information Systems (3 hours)
 - Course introduction
 - History of GIS development and current GIS software
 - GIS system components, capabilities and trends
 - The GIS process
 - Applications of GIS analyses
2. Cartography (6 hours)
 - Map purpose, design, concepts and components
 - Cartographic use of colours
 - The map production process
 - Datums, coordinate systems and map projections
3. GIS Data Models (6 hours)
 - Collection and input of GIS data
 - Vector, raster and object-oriented GIS models
 - Topology
 - Relational databases
 - GIS programming
4. Data Quality and Errors (3 hours)
 - 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)
5. Data Analysis and Modeling (3 hours)
 - Map overlays and queries
 - Interpolation and classification
 - Integration of attribute data
 - Raster GIS analysis
 - 3-D, network and regional analyses
6. ArcView Projects (6 hours)
 - Projects, views, tables and layouts
 - Shapefiles
 - ArcView file management
 - Queries

Course Name

Code No.

7. Producing Maps, Tables and Charts (9 hours)
 - Adding attributes and external databases to ArcView tables
 - Creating charts and reports
 - Adding graticules, scales, legends and north arrows to layouts
 - Changing map projections
 - Digitizing in ArcView
 - Working with GIS, GPS and remote sensing data

8. ArcView Extensions (6 hours)
 - The geoprocessing wizard and Spatial Analyst extensions
 - Queries, clipping, overlaying, buffering and intersecting themes
 - Three-dimensional elevation modeling in ArcView (3-D Analyst)
 - Reading CAD (Computer Aided Design) files
 - The Network Analyst extension

 Course Name

 Code No.
IV. REQUIRED RESOURCES/TEXTS/MATERIALS:

Aronoff, Stan. 1996. Geographic Information Systems: A Management Perspective. WDL Publications.

V. EVALUATION PROCESS/GRADING SYSTEM:**Grading System:**

Assignments (3)	30%
Mid-Term Test	20%
Seminars	15%
Final Exam	<u>35%</u>
	100%

The following semester grades will be assigned to students in post-secondary courses:

<u>Grade</u>	<u>Definition</u>	<u>Grade Point Equivalent</u>
A+	90 – 100%	4.00
A	80 – 89%	3.75
B	70 – 79%	3.00
C	60 – 69%	2.00
R (Repeat)	59% or below	0.00
CR (Credit)	Credit for diploma requirements has been awarded.	
S	Satisfactory achievement in field placement or non-graded subject areas.	
X	A temporary grade. This is used in limited situations with extenuating circumstances giving a student additional time to complete the requirements for a course (see <i>Policies & Procedures Manual - Deferred Grades and Make-up</i>).	
NR	Grade not reported to Registrar's office. This is used to facilitate transcript preparation when, for extenuating circumstances, it has been impossible for the faculty member to report grades.	

Course Name

Code No.

VI. SPECIAL NOTES:

Special Needs:

If you are a student with special needs (e.g. physical limitations, visual impairments, hearing impairments, or learning disabilities), you are encouraged to discuss required accommodations with your instructor and/or the Special Needs office. Visit Room E1204 or call Extension 493, 717, or 491 so that support services can be arranged for you.

Retention of course outlines:

It is the responsibility of the student to retain all course outlines for possible future use in acquiring advanced standing at other post-secondary institutions.

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.

Substitute course information is available in the Registrar's office.

VII. PRIOR LEARNING ASSESSMENT:

Students who wish to apply for advanced credit in the course should consult the instructor. Credit for prior learning will be given upon successful completion of the following:

VIII. DIRECT CREDIT TRANSFERS:

Students who wish to apply for direct credit transfer (advanced standing) should obtain a direct credit transfer form from the Dean's secretary. Students will be required to provide a transcript and course outline related to the course in question.