



## I. COURSE DESCRIPTION:

This course will introduce the student to some advanced programming techniques. We will use ESRI's ArcObjects and the Python scripting language to build custom functionality into the ArcMap GIS applications..

## II. LEARNING OUTCOMES AND ELEMENTS OF THE PERFORMANCE:

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

### 1. Review of key Programming Concepts.

#### Potential Elements of the Performance:

- Coding Standards
  - How to properly and consistently produce well written and readable computer code.
  - White Space and its importance in Python
  - Variable naming conventions
  - Comment Headers and Comments through-out program modules
- Understand the concept of what Objects are and how we define them in application development.
- Know the different components of an Object:
  - Property
  - Method
  - Event
- In VB.Net to create custom ArcGIS functionality we use ArcObjects a large library of ArcGIS programming Objects.
  - Set references to required libraries
  - Import libraries into code
- In Python we use the ArcPY library
  - Import ArcPY into Python code.

### 2. Develop ArcMap Add-Ins to expand the functionality of the applications

#### Potential Elements of the Performance:

- Understand how using VB.Net 2010 and ArcObjects we can build new functionality into the ArcGIS suite of applications.
- Recognize the different type of components we can develop:
  - Command Buttons

- Toolbars

3. Gain experience with the Python Scripting Language.

Potential Elements of the Performance:

- Become familiar with the Python language syntax.
  - Learn the differences between Python and VB.Net
- Get Experience with the different development platforms available for Python:

- Using Python with ArcMap using its own ArcPy Editor
- Using Python with PythonWin development environment

4. Understand how to use ArcPy library for Python to extend ArcGIS functionality.

Potential Elements of the Performance:

- Learn to use ArcPy to simply Geoprocessing tasks.
- Understand how to use built in tools with ArcPy
- Get experience using spatial data with ArcPy.
- Get experience manipulating spatial data with ArcPy.
- Build Add-Ins using ArcPy

### III. TOPICS:

1. Coding Standards

- Variable Declaration
- White Space in code
- Commenting

2. Object Oriented Programming

- What is an Object
- What are the components that make up an Object
- How develop code to define Object

3. ArcObjects

- What they are
- How we can use them to add custom functionality into the ArcGIS suite of applications

#### 4. Add-In Development

- How to create an Add-In using ArcObjects and Visual Basic 2012
- Create an Add-In Button Control
- Create an Add-In Toolbar to act as a container for our new Controls.

#### 5. Python Scripting Language

- Python programming language syntax
- Variable declaration
- Arithmetic operators
- Comparison operators
- Looping constructs
- String variable operations

#### 6. Using ArcPy with Python

- How to add ArcPy library to a Python application
- Use the built-in ArcPy editor in ArcMap to script Geoprocessing Functions
- Exploring Spatial Data with ArcPy
- Map Scripting with ArcPy Mapping module.
- Creating Custom Tools using ArcPy Scripts
- Build ArcPy applications in PythonWin to simplify ArcGIS functions
- Build ArcPy Add-Ins to extend ArcMap functionality

### IV. REQUIRED RESOURCES/TEXTS/MATERIALS:

None

### V. EVALUATION PROCESS/GRADING SYSTEM:

Tests	60%
Assignments	20%
Labs	<u>20%</u>
	100%

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	
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.