

**Fond du Lac Tribal and Community College
COURSE OUTLINE FORM**

01/21/16

Please return this form to the college vice president of academic affairs and the chairperson of the Academic Affairs and Standards Council (AASC)

1. Prepared by: _____

2. Date submitted: _____

3. Date approved: 05/09/08 Date revised 11/30/17

4. Department/discipline: Geography

5. Department(s) endorsement(s): _____

(Signatures of the person(s) providing the endorsement are required.)

6. Course Title: Programming in GIS

Abbreviated course title (25 characters or less): _____

7. Course Designator: GEOG 8. Course Level: 2054

9. Number of Credits: Lecture 1 Lab 2

10. Control Number (on site) 24 Control Number (online) _____

11. Catalog/Course description:

This course covers the automation of geoprocessing tasks using graphic GIS software, Python scripts, and open-source command line utilities. Students will be introduced to programming in Python and on the Windows command line, and will learn how to automate tasks with ArcGIS Model Builder, how to translate Model Builder into Python scripts, and how to create custom toolboxes for ArcGIS. No previous programming experience is assumed. (Prerequisite: GEOG 2001 or instructor consent)

12. Course prerequisite(s) or co-requisite(s): Accuplacer scores/ Other courses

Prerequisite(s): GEOG 2001 Introduction to GIS or instructor consent

Co-requisite:

13. **Course Materials** (Recommended course materials and resources. List all that apply, e.g. textbooks, workbooks, study guides, lab manuals, videos, guest lecturers).

Textbook: Downey, Allen B. *Think Python: How to Think Like a Computer Scientist*. Green Tea Press. Available for free online.

Additional Resources:

- GIS Lab (Room 208) with ESRI ArcGIS software installed on networked PCs (includes Python 2.7 or Python 3)
- OSGeo4W open-source software package installed on lab PCs
- One-year student licenses for ESRI ArcGIS desktop software
- ESRI online documentation and Virtual Campus courses
- Python online documentation

- GDAL/OGR online documentation
- Supplemental articles, videos, and case studies

14. Course Content (Provide an outline of major topics covered in course)

1. Using Model Builder to automate GIS tasks
2. Programming basics
3. Python variables, expressions, and statements
4. Python control flow
5. Python functions
6. Python containers
7. Shallow and deep copies
8. Python file processing and I/O
9. Command line GDAL/OGR
10. Batch scripts with GDAL/OGR and other tools
11. ArcPy
12. Translating Model Builder into a Python script
13. Creating an ArcGIS Toolbox

15. Learning Goals, Outcomes, and Assessment

At FDLTCC we have 4 Competencies Across the Curriculum (CAC) areas. They are as follows:

- A. Information Literacy (the ability to use print and/or non-print tools effectively for the discovery, acquisition, and evaluation of information)
- B. Ability to Communicate (the ability to listen, read, comprehend, and/or deliver information in a variety of formats.)
- C. Problem Solving (the ability to conceptualize, apply, analyze, synthesize, and/or evaluate information to formulate and solve problems.)
- D. Culture (knowledge of Anishinaabe traditions and culture, knowledge of one's own traditions and culture, knowledge of others' traditions and cultures, culture of work, culture of academic disciplines and/or respect for global diversity.)

Course Learning Outcomes will fulfill the identified competencies.

Course Learning Outcomes.

Upon completion of this course, students will be able to:

1. Implement pre-programmed tools and toolboxes using Model Builder (C)
2. Construct a Python script to perform repeatable data processing tasks (C)
3. Open, read, write, and save files using a Python script (C)
4. Create a batch script for geospatial data processing with GDAL/OGR tools (C)
5. Read and interpret online documentation and examples to determine how to accomplish a scripting task (A, C)
6. Write scripts to automate GIS tasks using Python and ArcPy (C)
7. Create a working custom toolbox for ArcGIS with documentation describing its purpose and usage (B, C)

16. **Minnesota Transfer Curriculum (MnTC):** If this course fulfills an MnTC goal area, state the goal area and list the goals and outcomes below:

See www.mntransfer.org

Goal Area(s): _____

Does this course require additional material for specific program requirements?
If yes, please provide.

01/21/16