

# Geography 476 - Programming for Geographers

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## Course Synopsis

Programming is a way of extending and automating computer tasks and creating custom user interfaces. This course will teach programming from the beginning- conceptualizing a program and then present the basic elements used to create programs. In the latter part of the course, we will work with ArcObjects, the tools used to customize & automate tasks in ESRI's ArcGIS products.

## Why is this course important?

Programming effectively multiplies your abilities by freeing your own time. With a program, you can set a computer to run a complex task automatically and repeatedly. You can also design programs that enable less sophisticated GIS users conduct an analysis that would normally be above their technical expertise. Being able to program is a high-value skill that will help you adapt to a wide variety of work roles.

## Class Resources

There are two required books:

- 1) David Schneider, *An Introduction to Programming Using Visual Basic 6.0*
- 2) *Introduction to ArcObjects*

Additionally, we will be using the following software:

VBA editor on *ESRI ArcMap 9.2/9.3*

(9.2 is installed in the Open Lab, 9.3 will be provided for home use)

Presentations, assignments, and other course materials will be posted to the Blackboard system at <http://elms.umd.edu>. Assignments will be turned in there as well unless specified otherwise.

## Grading

This class will require a significant commitment in time for programming assignments. The midterm and final exams will be projects that demonstrate your ability to synthesize the material and to produce working programs that incorporate geographic concepts. The course grade will be according to the following pattern:

**25%** : Midterm program (Lab 6)

**25%** : Final program

**50%** : Weekly programming assignments

## Makeup Policy

This course will rapidly introduce concepts that build upon each other and it is crucial that you keep up. As a result, all assignments must be turned in at the beginning of the class at which they are due. No late assignments will be accepted without prior arrangement or a documented, University-approved excuse. If you believe that you will need additional time to complete an assignment, please contact me as soon as you can so that appropriate arrangements can be made.

## **Student & Faculty Expectations**

I expect students to be ready to engage with a complex and highly technical subject. As part of this readiness, students should read the materials for a class prior to the presentation (full understanding of the reading material is not required) and projects will be completed by the time due. In return, you should expect me to present the material in a clear manner, answer questions during class time (though I may wait to complete a slide or section before addressing the question) and be flexible with assignment scheduling if it is clear that a major, class-wide problem occurs with the material.

You should also expect a respectful classroom attitude from all participants in the class, the instructor, teaching assistant and your fellow classmates. Disruptive behavior of any kind will not be tolerated. Students are expected to adhere to the Code of Student Conduct; instructional faculty will be held to at least that standard as well.

## **Students with Disabilities**

I will make every effort to accommodate students who are registered with the Disability Support Services (DSS) Office and who provide me with a University of Maryland DSS Accommodation form which has been updated for the Fall 2008 semester. This form must be presented to me no later than October 1, 2008. I am not able to accommodate students who are not registered with DSS or who do not provide me with documentation which has been reviewed by DSS after October 1, 2008.

## **Academic Honesty**

The University of Maryland, College Park, has a nationally recognized Code of Academic Integrity, administered by the Student Honor Council. This Code sets standards for academic integrity at Maryland for all undergraduate and graduate students. As a student, you are responsible for upholding these standards for this course. It is very important for you to be aware of the consequences of cheating, fabrication, facilitation, and plagiarism. For more information on the Code of Academic Integrity or the Student Honor Council, please visit [www.shc.umd.edu](http://www.shc.umd.edu).

**Note:** Within our class, you may work together to discuss concepts and solution ideas, but you must then produce a program that is original and individual unless otherwise specified.

## Course Schedule

This schedule may be modified as the need arises:

| Week | Lecture Date | Topic  | Lab Exercise   | Reading                  | Labs Due     |
|------|--------------|--|--|--------------------------|--------------|
| 1    | 9/8          | Course Introduction<br>Programming Overview<br>Designing a Program | Project 0:<br>Constructing a<br>Model- Flow Chart                                  | 1.4, 2.1,<br>2.2         | 9/15         |
| 2    | 9/15         | Variables & Constants<br>Assigning value<br>Arithmetic Statements  | Project 1:<br>Hello World!   | 3.3, 3.4,<br>Burke Ch. 2 | 9/22         |
| 3    | 9/22         | Boolean Logic<br>Decisions   | Project 2: Distance<br>on a Great Circle<br>Project 3:<br>Measurement<br>Converter | Ch. 5                    | 10/6         |
| 4    | 9/29         | No Class (Rosh Hashana)  |  |                          |              |
| 5    | 10/6         | Input/Output<br>Repetitions  | Project 4:<br>Reading a GPS file   | 3.5, Ch. 6               | 10/13        |
| 6    | 10/13        | String Functions<br>Subroutines                                    | Project 5:<br>Linear Regression  | 3.6, Ch. 4               | 10/20        |
| 7    | 10/20        | Object Oriented<br>Programming (OOP)                               | Project 6: Midterm   | Ch. 13                   | 11/3         |
| 8    | 10/27        | OOP cont.  | Project 6: Midterm   |                          | 11/3         |
| 9    | 11/3         | Arrays (1-dimensional)   | Project 7:<br>Descriptive<br>statistics  | Ch. 7                    | 11/10        |
| 10   | 11/10        | Arrays (2-dimensional),<br>Stacks & Queues                         | Project 8:<br>Network Statistics   |                          | 11/17        |
| 11   | 11/17        | Introduction to<br>ArcObjects                                      | Project 9:<br>Map Layers   | Burke,<br>Ch. 10-11      | 11/24        |
| 12   | 11/24        | ArcObjects   | Project 10:<br>Queries & Cursors   | Burke,<br>Ch. 12, 14     | 12/8         |
| 13   | 12/1         | ArcObjects   | <b>Final Project<br/>Assigned</b>  | Burke,<br>Ch. 17-18      | <b>12/18</b> |
| 14   | 12/8         | ArcObjects   |  |                          |              |

In accordance with the Schedule of Classes, the final project will be due at 6:00 p.m. on Thursday, Dec 18th.