Geog 419/419G: GIS Applications Development (Spring 2011)

Instructor: Dr. Jun Yan   **Room**: IEB 301 Computer Lab (or online)

Office: EST 333   **Time**: MW 12:40 pm – 2:00 pm (or online)

E-mail: jun.yan@wku.edu   **Office Hour:** MW 10:00 am – 12:00 am or by appointment

Office Tel: (270)745-8952   **Prerequisite:** GEOG 317 and CS 230 or special permission

Course website: https://ecourses.wku.edu/

Texts:

1. **Burke, Robert. 2007. *Getting to Know ArcObjects: Programming ArcGIS with VBA*. 2nd Edition. ESRI Press, Redlands, California (required).**

2. Kang-Tsung Chang. 2008. Programming ArcObjects with VBA: A Task-Oriented Approach. 2nd Edition. CRC Press, Boca Raton, Florida (optional).

3. Michael Zeiler. 2001. *Exploring ArcObjects*. Vol. I & II. ESRI Press.

4. ESRI Developer Network Online: http://edn.esri.com/

5. ESRI ArcGIS Resource Center – ArcGIS 9.3 – Customizing:
   http://resources.arcgis.com/content/arcgisdesktop/9.3/customizing

6. ArcScripts Online: http://arcscripts.esri.com/

7. UML Resource Page: http://www.uml.org/

8. *Geographic Information Systems and Science*, by Longley et al. (optional)

9. *Microsoft Visual Basic 6.0 Programmers Guide*, by Microsoft (optional)

Course Description:
GIS can be applied into many real-world fields, such as environmental management, market research, urban planning, transportation management, water resource management, utility planning and management, etc. Different application domains may have different requirements and needs for GIS. However very few applications deliver exactly what users require '***out of the box***', and GIS is no exception. Thus it is very necessary to learn the process to expend the capability of any GIS system. In this course, you will learn that ArcGIS is considerably more than a desktop computer program, and that to access the additional flexibility available, you need to become an **advanced** user conversant with a range of technologies and methods, including computer programming. In addition, you will also study the main issues related to plan and implement a GIS within an organization, and design and develop GIS applications to support specific tasks. Students are expected to gain a basic understanding of the common technical elements of a GIS project and become familiar with GIS application issues. Two categories of topics related to GIS project development and management will be covered with main emphasis on the second:
   (1) GIS application development, including system analysis and design issues;
   (2) The applications software development, mainly Object-Oriented Programming.

Course Objectives:
   1. Get familiar with the concepts underlying the development of GIS applications in the real world;
   2. Understand the basic issues related to GIS design;

3. Develop competency with basic object-oriented (OO) analysis, design, and **programming** skills for GIS applications;
4. Gain an understanding of uses and steps involved in implementing and managing a GIS within an organization.

Class Format and Policies:

The course format will be the combination of *class meetings* and *web guided self studies* using WKU E-courses. Students are expected to use **http://ecourses.wku.edu** regularly for available class materials and electronic submission of their exercises, assignments and projects. This class website contains lecture notes, assignments, other materials related to the course, student grades as a way to monitor progress in the class, and other pertinent information. The class meetings include the lecture and lab components. Lecture focuses on the conceptual basis of GIS application design & development and computer programming. The labs provide students with opportunities to get familiar with programming ArcGIS using Visual Basic for Applications (**VBA**). Note that all project assignments and exercises will require time outside of class to complete. Auditing of this course is not allowed.

Grading:
The evaluation of your performance in this course will be derived from (i) an exam covering aspects of GIS applications development, object-oriented analysis, design and programming; (ii) six programming assignments; (iii) the completion of all required lab exercises in your textbook and a ESRI online VBA course (course code will be hand out in the first week of the class). You will earn points toward your final grade according to the following schedule:

Item	Points (Undergraduate)	Points (Graduate)
Programming Assignment #1	5	5
Programming Assignment #2	10	10
Programming Assignment #3	20	15
Programming Assignment #4	10	10
Programming Assignment #5	20	15
Programming Assignment #6	NA	15
Lab exercises	10	10
Midterm Exam	25	20

Grading will follow the below scale:

Average Score	Grade
90 – 100	A
80 – 89.9	B
70 – 79.9	C
60 – 69.9	D
< 60	F

Attendance:
Class attendance is required during class meetings. Remember this is a programming course. To advance, you have to rely on topics covered in previous classes. Roll will be taken at the start of every class period. If a student enters class late it is his or her responsibility to see me at the end of the class

<u>period</u> and make sure I have marked them as present. Student who has absence record will have a 2-point deduction for each day that he/she misses. The exception can be made only if legitimate written document is presented and the instructor is notified beforehand. The student is responsible for all lecture notes, materials, etc.

Exam:
The only exam covers the first half of our discussion. Make-up exam will be given only for the following special circumstances: (1) a university-sponsored event, and (2) illness with a doctor's written excuse. Justifying documentation has to be presented to (and accepted by) the instructor **BEFORE** the date of the exam.

GIS Lab Policies:
The GIS lab is available for use any time during the day when a class is not scheduled (schedule posted on lab door). Evening hours will be made available and announced as soon as the lab monitor schedule is finalized. The lab is only to be used, however, only for work related to GIS and remote sensing classes. Work such as term papers for other classes should be done in one of the universities general computer labs (for locations, see http://stech.wku.edu/lablocations.html). Do not print papers for other classes or material downloaded from the Internet on the printer in the GIS lab. Food, drink and tobacco products are strictly prohibited from the lab to protect the university's investment in computer equipment and keep the facility looking nice. The lab is monitored with cameras to enhance security.

Course Withdrawal:
Students who find it necessary to withdraw completely from the university (WKU) or from this course should report to the Office of Registrar in Potter Hall to initiate **W**ithdrawal procedures before the last **W**ithdrawal date. Students who cease attending class without and official **W**ithdrawal will receive a **F**ailing grade.

Students with Disabilities:
Students with disabilities who require accommodations (academic adjustments and/or auxiliary aids or services) for this course must contact the Office for Student Disability Services, Room 445 in Potter Hall. The Office for Student Disability Services telephone number is (270) 745-5004 V/TDD. Please do not request accommodations without a letter of accommodation from the Office for Student Disability Services.

Other Policies:
The Department of Geography and Geology strictly adheres to university policies, procedures, and deadlines regarding student schedule changes. It is the sole responsibility of the student to meet all deadlines in regard to adding, dropping, or changing the status of a course. Only in exceptional cases will a deadline be waived. The Student Schedule Exception Form is used to initiate all waivers. This form requires a written description of the extenuating circumstances involved and the attachment of appropriate documentation. Poor academic performance, general malaise, or undocumented general stress factors are not considered as legitimate circumstance.

Tentative Course Outline: subject to revision as conditions warrant.

Week	Topics
1	• Syllabus & course organization • Introduction to GIS project development and ArcGIS Customization • Introduction to the VB and VBA • **Programming Project #1**
2	• VBA Programming – Form and Control • VBA Programming – Variables and Working with Objects • VBA Programming – Decision Structure
3	• VBA Programming – Decision Structure • VBA Programming – Working with Subroutines and Functions • VBA Programming – Looping Structure • **Programming Project #2**
4	• VBA Programming – Storing and Processing Data • VBA Programming – Storing and Processing Data • VBA Programming – Application Testing and Distribution • **Programming Project #3**
5	• Design – Basic concepts in Object-Orientation • VBA Programming – Class Module and Component Object Model (COM)
6	• ArcObjects - Introduction to ArcObjects and ArcObjects Model Diagram • *Review for Mid-Term Exam*
7	• **Spring Breaks. No Classes**
8	• ArcObjects - ArcGIS GUI Objects • **Programming Project #4**
9	• ArcObjects - ArcMap Core Objects • *Mid-Term Exam on Thursday*
10	• ArcObjects - ArcGIS Cartography Objects • **Programming Project #5**
11	• ArcObjects - ArcGIS Cartography Objects
12	• ArcObjects - Geodatabase Objects • **Programming Project #6**
13	• ArcObjects - Geodatabase Objects
14	• ArcObjects - Geodatabase Objects
15	• ArcObjects - Geodatabase Objects
16	• **Exam week: Programming Project #6 Due**