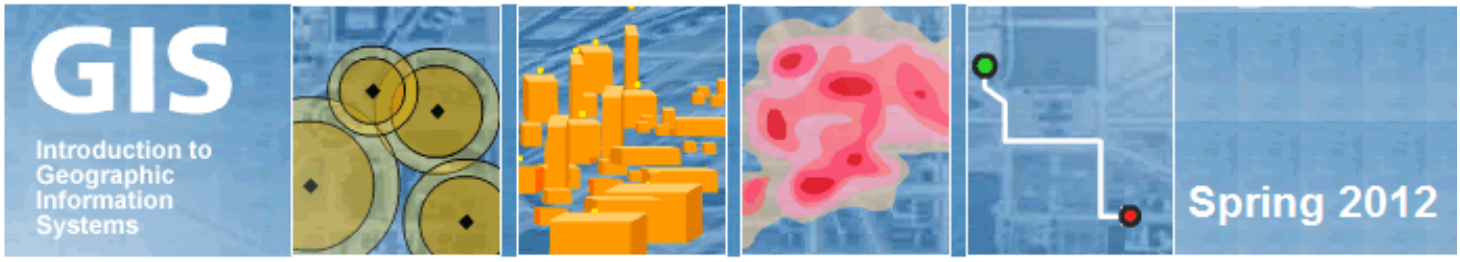

Bio/ES 465

COURSE DESCRIPTION

Geographic information systems are powerful computer-based tools for capturing, organizing, displaying, and analyzing spatial data. GIS technology allows users to view, evaluate, and analyze data to reveal relationships, patterns, and trends and to produce maps, graphs, and reports. This is useful in a many fields, including biology, environmental science, computer science, geology, social sciences, and business – any field in which professionals are required to answer questions and solve problems that involve spatial data. This course is designed to introduce the fundamental concepts of GIS and to provide you with experience in using ArcGIS, the industry standard software for GIS. The course emphasizes hands-on experience with GIS utilizing real-world data to illustrate how GIS technology can be used to answer questions and address problems in a wide variety of situations.

INSTRUCTOR

Dr. Ann Throckmorton, Professor of Biology

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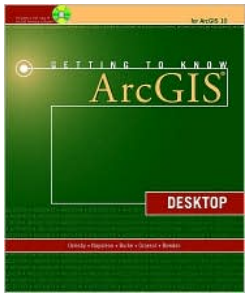
Office hours:	Monday 11:30-12:30 Wednesday 12:50- 1:50 Thursday 12:40 - 1:50 Friday 10:30- 11:30 *or by appointment*

CLASS

Monday, Wednesday 6:30 p.m. – 8:00 p.m. Hoyt Computer Lab

Attendance in lecture is expected but you will not be graded on attendance except indirectly through your grades for exams, quizzes, and assignments. Because your success in this course is strongly dependent on your presence in class and your participation, you should make an effort to be present at all class sessions. If you miss class, it is your responsibility to contact me and to obtain lecture notes and assignments that were given during your absence.

REQUIRED MATERIAL Textbook: *Getting to know ArcGIS desktop* by Tim Ormsby et al. ©2010, ESRI Press



The book includes a DVD with all of the data that you will need to complete the exercises. If you buy a used copy of the book, make sure the DVD is included.

The software we will be using in this class is ArcGIS Desktop 10 from the Environmental Systems Research Institute (ESRI). It is available in the public computer labs in Hoyt and McGill and in the biology computer lab on the third floor of Hoyt. For your personal computers, a free 180-day trial of the software is offered with your textbook. You can go to http://www.esri.com to create an account then download the software at http://esripress.esri.com/display/dsp_ArcGIS10Eval.cfm.

You may also want to have a flash drive or external hard drive that you can use to store, organize, and transport the files you will create and use in the course.

GOALS OF THIS COURSE

In this course, you will:

1. discover how geographic information systems function and how they can be used to visualize, analyze, and present spatial data;
2. gain hands-on experience with ArcGIS Desktop 10, the industry standard desktop GIS software.
3. learn to create and manipulate GIS files and databases;
4. become aware of various sources of data that can be graphed and analyzed using GIS;
5. become aware of the nature and characteristics of spatial data and objects and how those can be manipulated using GIS
6. list and define typical GIS operations and become proficient in their use; and
7. use GIS to complete an in-depth analysis of a topic related to your field of study.

METHODS OF INSTRUCTION

1. **Assignments**: Most of the assignments in this course will involve hands-on activities to help you become familiar with ArcGIS. During the first half of the semester, most of your time will be spent doing exercises from your textbook, *Getting to know Arc GIS desktop*. Occasionally, you will be given assignments designed to teach fundamental concepts of GIS, GPS, and mapping and to show you how to locate, access, and manage different types of GIS data. The assignments are worth 20% of your final grade.
2. **Quizzes**: Quizzes will be given after you have completed a number of exercises in your textbook. Most quizzes will be practical, requiring you to use GIS to apply the skills that you have learned by completing the assignments. The quizzes are worth 15% of your final grade.
3. **Final exam**: The final exam will be comprehensive. The largest part of the exam will be practical. You will be required to locate, manipulate, analyze, and present data using ArcView. You should be able to apply all of the skills that you learned in the assignments and that you were previously quizzed on. A shorter written portion of the exam will test your knowledge of basic information related to GIS, GPS, and mapping. The final exam is worth 15% of your final grade.
4. **Individual project**: throughout the semester you will work on an individual project that you will design and complete. This will be your chance to apply GIS to a topic that you are especially interested in. During the last two weeks of the semester, everyone will present their project to the other members of the class. The project is worth 50% of your final grade. Of that, 45% will be based on the quality of the project that you turn in and 5% will be based on your presentation.

Your final grade in the class will be based on the following scale:

Above 93%: A	87% - 90%: B+	77% - 80%: C-	67% - 70%: D+	Below 60%: F
90% - 93%: A-	83% - 87%: B	73% - 77%: C	63% - 77%: D	
	80% - 83%: B-	70% - 73%: C-	60% - 73%: D-	

Course Policy On Exams and Assignments

You must take the quizzes and exams at the scheduled time unless you have talked to me before the day of the quiz or exam and been excused. Valid excuses include such things as serious illness or injury and personal and family emergencies.

Unless otherwise stated, assignments should be turned in by class time on the day that they are due. Late assignments will be accepted but a late penalty will apply; the number of points that are subtracted will vary in proportion to the time elapsed since the due date.

You should turn in all assignments using the Assignments folder on the course r-drive. When you save a file to the r-drive, the name of the file must contain your name and some indication of what it contains (e.g., the name of the file could be "Smith, Assignment 5"). You must save the file to another drive, then save it to the r-drive. If you try to save directly to the r-drive, the network will only write a blank temporary file and you will lose all of your work. Once you have saved something to the Assignments folder you will be unable to retrieve it or delete it.

Academic Integrity

Academic integrity is central to the purpose and pursuit of any academic community. In this class, I expect you to adhere to the principles of academic integrity stated in the Westminster College handbook and to maintain the highest standards of academic honesty and integrity, in keeping with the philosophy and purposes of the College.

> "Academic dishonesty is a profound violation of this expected code of behavior. It can take several forms, including, but not limited to, plagiarism, cheating, purposely altering the work of another (without that person's permission), misrepresentation of attendance in class or at a College event, misrepresentation of work, facts or experimental results, unauthorized use of or intentional intrusion into another's computer files and/or programs, intentional damage to a computer system, unauthorized use of library materials and privileges, or engaging in any activity which attempts to alter or harm another's academic standing."

If you violate the Academic Integrity Policy, you will receive a score of zero for that assignment, quiz, or exam, and a written report will be sent to the Dean of Academic Affairs. More than one violation may result in an F for the course.

TENTATIVE SCHEDULE OF TOPICS, READINGS, AND ASSIGNMENTS

The course will follow the schedule below, with latitude for amplification and digression. All exercises are in your textbook, *Getting to Know ArcGIS desktop*.

Date	Topic	Reading/Exercise
January 18	Introduction to the course What is GIS?	
January 23	Introducing GIS Introducing ArcGIS desktop Exploring ArcMap Exploring ArcCatalog **Quiz #1, chapter 1**	Chapter 1 Chapter 2 Chapter 3 Chapter 4
January 25	Symbolizing features and rasters	Chapter 5
January 30	Classifying features and rasters	Chapter 6
February 01	Labeling features	Chapter 7
February 06	**Quiz #2, chapters 1 – 7**	
February 08	Querying data	Chapter 8
February 13	Joining and relating tables Selecting features by location	Chapter 9 Chapter 10
February 15	Preparing data for analysis Analyzing spatial data	Chapter 11 Chapter 12
February 20	**Quiz #3, chapters 8 – 12**	
February 22	Projecting data in ArcMap Introducing coordinate systems Building geodatabases	Chapter 13 Chapter 14
February 27	Creating features Editing features and attributes	Chapter 15 Chapter 16
February 29	Geocoding addresses	Chapter 17
March 03 to March 11	**Spring break**	
March 12	**Quiz #4, chapters 13 – 17**	
March 14	Making maps from templates	Chapter 18
March 19	Making maps for presentation	Chapter 19
March 21	Creating models	Chapter 20
March 26	**Quiz #5, chapter 18 - 20**	
March 28	Understanding metadata	
April 02	Work on individual projects	
April 04	Work on individual projects	

Date	Topic	Reading/Exercise
April 09	**Easter break**	
April 10	**Monday classes meet** Work on individual projects	
April 11	Work on individual projects	
April 16	Work on individual projects	
April 18	Work on individual projects	
April 23	Project presentations	
April 25	No class (Undergraduate Research Symposium	
April 30	Project presentations	
May 02	Project presentations	
May 07, 6:30 p.m.	**Final exam**	Chapters 1 through 20