GEOGRAPHY 204   APPLIED GIS   FALL 2012
                                 SYLLABUS

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Office Hours: Open. Best times: MWTh 10-1; Tu 10-1 or after 2:30 (call/email to be sure I'm in).

COURSE CONTENT AND GOALS[1]

Geographic Information Systems (GIS) are database systems for storing, organizing, analyzing and visualizing data that have spatial locations, and they are amazing. GIS and related technologies like GPS are collectively Geographic Information Technologies (GIT) and represent an enormous advancement in our ability to make sense of space, place, and geographic relationships. They have revolutionized geography, ecology, environmental science, archaeology, geology, engineering, planning, and other academic fields and professions.

GIS is also a valuable job skill. The U.S. Dept. of Labor has identified three areas that will dominate the U.S. economy and job growth in coming decades: biotech, nanotech, and geotech. The availability of small, cheap, precise GPS chips has made it possible for everything from cell phones to bulldozers to become spatially aware. GIS technology allows this awareness to be connected to other information sources via the internet and other networks, opening tremendous possibilities and opportunities (but also risks) that are fundamentally changing the ways we live and work.

GEOG 204 is designed to introduce you to this remarkable technology. By the end of the semester you should be able to use GIS to ask and answer questions about the real world. That is, you will be able to:

- Plan a GIS project, then create, locate, critically evaluate, modify, and use geographic data to answer questions about, identify problems related to, and/or develop solutions to problems related to people or the natural world;
- Carry out an analysis and report your findings using graphs, tables, and text; and
- Use the fundamental principles of cartographic design to produce effective, attractive, and interesting maps.

COURSE STRUCTURE AND UNDERLYING PHILOSOPHY

To meet these goals you will, for your final course project, design and carry out a GIS analysis or create a high quality cartographic product on a topic you find interesting. To do this, you will need to understand basic geographic and GIS concepts, as well as tools and techniques specific to the ArcGIS, the software suite we will be using. There is no quick and easy way to learn GIS. This is true for geographers, biologists, and environmental studies majors. It is true for computer scientists and engineers. It is true for people with master's degrees and with Ph.D.s. It will be true for you too.

There are two basic approaches to teaching and learning GIS. The first uses click-by-click instructions to show you how to accomplish a very narrowly-focused goal. This approach is straightforward, simple, and relatively painless. It is a useful first step, but it results in a shallow and brittle understanding of GIS. The second approach is to present you with a problem and minimal instruction, then leave you on your own to figure out how to solve it. The advantage to this approach is that it produces deep and flexible learning, mastery of concepts and software tools, and great problem-solving skills. The disadvantages are that it requires enormous patience and a great deal of time.

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[1] Relevant Geography Department goal: **appreciate the systematic character of academic geographical study**… Relevant CCC Goal: develop information literacy and technological competency across disciplines.

The course structure has evolved from long experience and has proven to be highly effective. It combines both approaches, alternating between detailed instruction and independent problem-solving at two different scales.

Each week during the first part of the semester, you will have a homework assignment based on your *Mastering ArcGIS* textbook. Each chapter has three parts: a "Mastering the Concepts" section. Next comes a click-by-click "Teaching Tutorial," which is followed by a series of exercises in which you use the tools and techniques presented, but without the detailed instructions. A glossary of terms and a skill reference section (straightforward instructions on how to perform specific tasks) are included at the end of the book. Both are invaluable.

We will begin each week's lecture section with a homework review and self-evaluation, then turn our attention to the next topic with a combination of lecture and in-class exercises to firm up your understanding of concepts (it is vitally important that you read the "Mastering the Concepts" section of each assigned chapter before coming to class). You then have six days to complete the next homework assignment. You should complete as much of your homework as possible before coming to the problem session, which will be an informal opportunity for you to obtain help with unresolved homework issues.

The overall semester structure follows a scaled-up version of the same logic: the first half of the semester is a very intensive introduction to GIS and the ArcGIS software. After the eighth week, you will apply what you have learned to complete an assigned group project, then a final project of your own design. You will not use all of the tools and techniques covered in the first part of the course for your projects. This does not mean that you will have learned those things for nothing, because our goal is not to complete a project, but to learn to use GIS.

In order to succeed in this course, you will need to plan on spending 8-14 hours on the assignments and project. This is an estimate based on past experience. Some of you may need less time than this, some more. Some weeks will involve less time, others more.

This is doable. Assuming 8 hours a day for sleeping, 3 for eating and other maintenance, and a normal course load, you should have 79 hours each week available for homework and amusement. Even if you find that it takes 14 hours to complete your week's work, you're still left with over sixty waking hours per week to get everything else done. Make commitments strategically and wisely, plan ahead, and work steadily, and you should be able to manage this. If you find yourself working more than 12 hours per week, ask for help.

GRADING
Your course grade will be based on the following percentage distribution:

Weekly Homework *	24
Progress Reports	16
Midterm Project	20
Final Project	40
Total	**100**

*Due at the BEGINNING of class each Wednesday. No late homework accepted for credit.

Attendance & Participation
It is extremely important that you attend each lecture session and stay current on your homework, since you will find it very difficult to catch up in this class if you fall behind. We only meet once per week and it is impossible to make up missed classes, so each unexcused absence is -7%. Dean's notification is required for excused absences. Plan ahead; DO NOT wait until the night before a due date to begin.

Participation in class is expected, but note that it is possible to earn negative participation points for behavior or activity that interferes with the conduct of class, is distracting to your peers, or otherwise interferes with their progress or success (minimum penalty per incident = 5%) This includes, but is not limited to:

- email, IM, web browsing, or other inappropriate computer use during class activities;
- tardiness or leaving class (except during breaks)
- inappropriate talking or other disruptions during class
- modifying, deleting, manipulating, or otherwise messing with anybody else's files, etc.

Most participation point losses have been due to the first item on the list. Non-GIS related computer activities distract your neighbors and will likely result your missing something and falling behind, in which case we will have to either hold up the entire class to get you back on track or simply leave you in the dust to flounder on your own. Neither outcome is acceptable. Multitasking is a myth. Focus.

Talking on cell phones in class is not permitted. You may use your cell phone for texting/reading texts in class up to a maximum of four times. Each use will result in a deduction of one letter grade from your final grade in the course (really); after the fourth infraction, you may text all you like, at home. (Turn your phone off when class starts.)

Projects
For the Midterm Project, you will complete an assigned task as a member of a team. Your final project will be a solo or group project (by permission) of your own choosing and design. You will need to know quite a bit about GIS before you can begin planning, but you should begin thinking about topics, interesting questions, and potential data sources *immediately*. I will work with you to ensure that your project is do-able within the number of weeks we have available. The sooner you can arrive at a topic, the easier your semester will be.

Letter grades
Letter grades are assigned in 10% decrements (90%-100% = A; 80-89.9% = B, etc) from the highest score in the class, with +/- grades assigned for point totals within 2.5% of letter grade breakpoints. There is no curve.

ARCGIS, THE 220 COLEMAN COMPUTER LAB, AND GETTING HELP
ArcGIS only works under the MS Windows operating system, so you also need to understand Windows. ArcGIS is available on any campus computer, and it is possible to obtain an installation disk to install ArcGIS (one year license) on your personal computer. Just ask.

The lab in Coleman 220 is reserved for students enrolled in a small number of classes. Except when it is being used for class sessions, you will have access to the lab 24 hours a day, 7 days a week, though the building's exterior doors are locked at 11 p.m. **DO:** keep the lab neat and be respectful of other users. If you're working on a project and have to leave for a brief time, leave a note. If you're going to be gone for more than an hour, log out and move your stuff where it won't be in the way. **DO NOT:** build a nest at a particular computer and think of it as your own. If you're working on a project and have to leave for a

brief time, leave a note on the keyboard. If you're going to be gone for more than a few minutes, log out and move your stuff where it won't be in the way. Also, <u>don't leave anything valuable unattended in the lab, prop the door open when you leave the room, or give out the pass code for the door.</u>

ON PLANNING AHEAD
Chances are, there will be many times, especially later in the semester, when you find yourself absolutely stuck. Often as not, the solution will be something incredibly simple, but utterly opaque until you figure it out. This will be frustrating—sometimes maddeningly so. It is an unavoidable part of the process of learning (and doing) GIS. Developing your ability to deal with the frustration and solve software problems is a crucial skill in and of itself. The more and better you understand computers, ArcGIS, and the jargon, the less trouble you'll have. However, I don't know anybody—GIS professionals included— who doesn't get stuck regularly.

That being the case, **you absolutely must plan ahead and give yourself enough time to complete assignments on time.** Start work the day you receive each assignment, so you can go do something else if you find yourself utterly stuck and can ask for help the next day, when there's still plenty of time. If you're stuck at 10 p.m. the night before the assignment is due, you're on your own.

CHEATING
Zero tolerance policy. **Any suspected case of academic dishonesty** (cheating, plagiarism…) will be reported in accordance with Bucknell's policy on academic responsibility.* You should be well aware of this policy and stick to it. http://www.bucknell.edu/AcademicResponsibility/

SCHEDULE (MAY BE ADJUSTED SLIGHTLY IF NEEDED)

Week	Date (Wed)	Themes	Reading due	Assignment due
1	22-Aug	Intro to GIS, ArcGIS, and FILE MANAGEMENT	MAG Intro	
2	29-Aug	GIS Data and Mapping	MAG Ch 1, 2 & 3* MM i-xix, Ch 1-4	Ch. 1 Exercises
3	5-Sep	Rasters! Shaded relief, color	MAG Ch 8* MM Ch 11	Ch. 2 & 3 Exercises
4	12-Sep	Attributes and Queries	MAG Ch 4 & 5*	Ch. 8 Exercises
5	19-Sep	Spatial Joins and Spatial Analysis	MAG Ch 6 & 7*	Ch. 4 & 5 Exercises
6	26-Sep	Coordinate Systems and Editing	MAG Ch 11 & 12* MM Ch 5	Project pre-proposal Ch. 6 & 7 Exercises
7	3-Oct**	Geodatabases, Metadata	MAG Ch 14 & 15*	Ch 11 & 12 Exercises
8	10-Oct	Map Design Midterm Project	MM Ch 6 & 7	Ch. 14 & 15
9	17-Oct	Map Design Midterm Project	MM Ch 8 & 9	Progress Report
10	24-Oct	Map Design	MM Ch 10	Midterm Group Project
11	31-Oct	GIS Project Work		Progress Report
12	7-Nov	GIS Project Work		Progress Report
13	14-Nov	GIS Project Work		Progress Report
14	21-Nov	Thanksgiving Break		
15	28-Nov	Project Presentations		Project

MAG = *Mastering ArcGIS*; MM = *Making Maps*
* Read "Mastering the Concepts" section before lecture section.