Purpose
This course expands beyond fundamentals of GIS to offer intensive instruction in GIS analysis and cartography, advanced GIS applications and tools, and GIS integration with other applications and technologies. We will cover Geographic Information System (GIS) science and technology and how it is being applied in such diverse fields as planning, marketing, health, criminal justice, political science, natural resources, and engineering. Students will learn how reality is modeled in a GIS environment and the processes to collect, organize, analyze, and display geographic data obtained from diverse sources. We will introduce you to methods and practical applications of digital mapping and geographical information systems (GIS) in the context of planning, policy and design processes, and will use of the latest version of professional GIS software (ArcGIS 10.1). You will learn the basics of the application of GIS to planning and design processes, and after completing this course student should:

Course Objectives:
- have a basic understanding of the principles and science that underpin GIS technology
- understand the characteristics, advantages and disadvantages of the data models that exist to model reality in a GIS
- be familiar with geographic and projected coordinate systems
- have a working knowledge of data entry, organization, analysis (with vector and raster data), and be able to present results in a professional GIS system
- know the steps involved in carrying out a GIS project, and the major pitfalls to avoid in designing and implementing a fully functional GIS system
- be able to carry out a GIS project
- understand GIS models and modeling we enough to prepare them to take advanced urban and environmental modeling courses
- The design and presentation of maps
- The import, projection, and overlaying of GIS data
- Manipulation of GIS data and map layers
- Collection and editing of geographic data
- Site selection and alternatives comparison
- Development of spatial models
- Evaluation of road and transit networks
- Usage of image and (hopefully) 3-D data in a mapping environment.
Tentative Course Plan

Week 01  GIS Data
Week 02  Mapping & Presenting GIS Data
Week 03  Attribute Data & Data Collection
Week 04  Coordinate Systems
Week 05  Basic Editing & Topology
Week 06  Geodatabases & Metadata
Week 07  Queries & Spatial Joins
Week 08  Map Overlay & Geoprocessing
Week 09  Raster & Network Analysis
Week 10  Geocoding
Week 11  Cartographic Principles & Adobe Illustrator
Week 12  Animations, 3D Analyst & Google Sketchup
Week 13  Final Project Workshop
Week 14  Final Project Workshop
Week 15  Final Projects

Course Outcomes
The class has two desired outcomes:
(1) Experience with the systematic application of GIS in a planning process
(2) Training in GIS software.

At the end of class, students will be proficient not only in the basics of GIS data collection, processing and mapping, but in the steps of GIS-supported project design, analysis, presentation and spatial decision-making.

Course Structure & Teaching Philosophy
Course offerings will consist of lectures covering the material, and instructor-led exercises. Students will apply the material using urban and natural resource datasets and maps. Students will work independently on individual short assignments and a final project applying GIS tools to a relevant planning process. These weekly assignments parallel the chapters of the required texts.

Weekly assignments will consist of readings, exercises from the text, lab assignments and questions from the readings. Required homework and deadlines are detailed in the course plan and on Canvas. All map products are expected to be of professional print-quality unless otherwise noted.

Teaching philosophy:

1) Students have a vested interest in the class and play a key role in determining its course. I am always open to suggestions about how the course is taught and provide opportunities for you to provide feedback. Your feedback guides how we teach the class, as well as what material to emphasize, when possible.

2) Studies show that people retain much higher percentages of information in active learning environments and that people learn many different ways (e.g. by seeing, listening, speaking, and doing!) I believe that everyone learns best when they engage in all of these and strive to
provide a variety of learning environments and will ask you to engage in activities in which you will teach your peers. The philosophy goes: where a person may only retain 5% of information as the recipient of a lecture, they will remember 90% if they teach that same material to others.

3) It is my experience that an in-person or face-to-face experience offers far more learning potential, particularly in a subject such as GIS. You will be responsible for reading material and classroom time will be used to engage and reinforce that material, focus on key concepts, and guide you through exercises. You will succeed if you come prepared and participation helps everyone learn – it’s the class that makes the class.

GIS is an intriguing and unique language through which we communicate and organize information about the world. When engaging GIS, it is easy to appreciate the work as both science and art. I look forward to making this class a success with you and hope you leave with the enthusiasm I have for this topic.

**REQUIRED TEXTS**


You are responsible for obtaining, reading and understanding the material in these texts. Both of these are available at the Auraria Bookstore and can be obtained on-line at a good price.

I will also post material on Canvas or assign Internet-based material, which you will be responsible for reading and learning.

**REQUIRED TECHNOLOGY**

Computer (PC preferred and highly recommended)
Memory/Hard/Flash/Portable Drive (20 GB minimum recommended)

Software Used in This Course:
Internet Explorer (Microsoft), WinZIP, and Microsoft Office, Adobe Illustrator, among others, are required. All are available on the FAST server.

We will use Canvas for a variety of purposes (see details below), including posting course announcements, assignments, reading material, your grades, possibly on-line discussions, among others. I recommend checking Canvas frequently.

You will also have a FASTGIS account for this semester and use your student login for access. You will use this account to work on GIS exercises, access data, access course documents, and GIS software to complete assignments. The FAST website is an invaluable resource ([http://fast.cudenver.edu](http://fast.cudenver.edu)). You can also use the FASTlab remotely (i.e. from home or other internet-connected computer) and instructions are on the website. If you have trouble with the FASTlab or your FAST account, contact me.
Canvas Materials
All of the course material (class presentations, journal articles, GIS related news, websites, and forums) for the class will be provided through Canvas. Canvas is a web-based course management program providing 24/7 access to class materials and a forum outside of class for the students to communicate and discuss the issues covered in class. To log on, go to:

https://ucdenver.instructure.com

If you have not used Canvas, use your student ID number for both user ID and password. Once in, you may personalize them. If you have used Canvas or Blackboard, your previous user ID and password should work. NOTE: It is the responsibility of the student to make sure that he or she has access and is registered on Canvas. Any difficulties should be reported quickly to the instructor.

IMPORTANT DEADLINES:

Other Related Texts:
These texts may be useful, depending on your background, what you wish to get out of this course, and what you plan to do with mapping in the future.

A light introduction and reference to ESRI GIS software and its capabilities. This text has been used in other GIS courses here at UCD and contains CDs with limited license software and tutorial examples. This might be useful if you wish to get a head start for the GIS courses at UCD.

Designed to provide students in a first or second GIS course with a solid foundation in both GIS concepts and the use of GIS. Introduction to GIS strikes a careful balance between GIS concepts and hands-on applications. The main portion of the chapter presents GIS terms and concepts and helps students learn how each one fits into a complete GIS system. At the end of each chapter, an application section with 2-7 tasks presents students with actual GIS exercises and the necessary data to solve the problem.
**GRADING POLICIES**
Your grade will be calculated from exams, exercises, a presentation, a final project, and participation. Students requiring extra time for assignments due to medical or other conditions are responsible for seeing me at the beginning of the semester.

**Make-up Work; Late Labs**
If you must miss an exam, please make arrangements with me prior to the exam date. **Assignments that are turned in late will not receive credit.**

**Curving and Extra Credit**
I reserve the right to reward extra credit for truly exceptional work and I may curve the grade if I believe there is sufficient reason—if, for example, I feel like some exam questions were unreasonable—I generally try to avoid both.

**Returned Work**
Uncollected assignments will be kept for one semester.

**Citing and Credit**
The work you submit for this class must be your own and submitted for this class alone. You may not submit the same paper or project for this class and another class. Work on a similar theme is encouraged, but the work for this class must stand on its own and meet the assignment requirements for this class. If you have a question about this, please speak to me.

Additionally, you must acknowledge the work of others by appropriately citing your sources; this includes Internet sites! Again, if you have questions, please ask. Please note: Wikipedia and some other Internet sources are not an acceptable peer-reviewed, reputable source. It can be a wonderful place to start when you know nothing or little about a subject in order to find other sources or to begin exploring a topic, but it is not an end point or a primary reference. Citing Wikipedia will cost credit. Again, if you have questions, just ask. Cheating, copying, and/or plagiarism will result in a zero for the applicable assignment or exam (also see Student Code of Conduct).

**Attendance Policy**
You need to attend class to do well. Some graded activities take place and are collected in class, and if you miss these, you cannot make them up. Additionally, information from the lectures, which may appear in quizzes are not necessarily covered reading assignments. If you miss class for any reason, you are responsible for obtaining notes and updates from classmates. Although I do post lecture notes on-line, you will find that lecture slides are not a substitute for the material covered in class.
Grading Breakdown

This course uses the following grading scheme (1000 points total):

<table>
<thead>
<tr>
<th>Grade</th>
<th>Score Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>950 - 1000</td>
</tr>
<tr>
<td>A-</td>
<td>900 - 949</td>
</tr>
<tr>
<td>B</td>
<td>834 - 866</td>
</tr>
<tr>
<td>B-</td>
<td>800 - 833</td>
</tr>
<tr>
<td>C</td>
<td>734 - 766</td>
</tr>
<tr>
<td>C-</td>
<td>700 - 733</td>
</tr>
<tr>
<td>D</td>
<td>634 - 666</td>
</tr>
<tr>
<td>D-</td>
<td>600 - 633</td>
</tr>
<tr>
<td>F</td>
<td>&lt;599</td>
</tr>
<tr>
<td>B+</td>
<td>867 - 899</td>
</tr>
<tr>
<td>C+</td>
<td>767 - 799</td>
</tr>
<tr>
<td>D+</td>
<td>667 - 699</td>
</tr>
</tbody>
</table>

Please note: I am very careful to make sure that all the grading throughout the course of the semester is fair. Consequently, I have decided that I will no longer entertain pleas for “bumping” the grade up a few points at the end of the semester. If you want a particular grade, make sure that you earn all the points you need and think about that from the first day of class!

I reserve the right to shift up to 5% of the points between categories as the needs of the course dictate.

**Participation / Quizzes (100 points):**
Credit from the participation category will be awarded based on your participation in the ongoing Trials & Tribulations discussion forum on Canvas. Weekly posting is required and is discussed in more detail on Canvas.

**Exams (300 points):**
There will be two exams based on material covered in class and the readings assigned throughout the semester. The exams will include a mixture of short answer, matching, essay, and problem-solving questions. I plan to provide some study guide material to help you, but you will need to spend time reviewing the material on your own before the exams.

**Exercises (400 points):**
Throughout the class, I will assign activities to help you learn the material, prepare you for the exams, and teach you the software. Much of this will involve learning new techniques, working through GIS processes, and producing maps with ArcGIS. As we progress through the course, I will expect you to utilize progressively more sophisticated techniques. It is therefore important that you stay on top of this work. I recommend keeping the assignments you have completed, as these can serve to help you with the following ones. I will almost always provide online real-time instruction to deal with rough patches in the exercises and I recommend taking advantage of that.

**Final Project (200 points):**
The “final project” will be worth 20% of the class grade and should require about 20% of the total effort and time expected for the class. This project will require you to use a variety of GIS processes and produce a series of highly polished maps in a detailed report format. I will discuss the project with you in the first few weeks and provide detailed instructions at that time.
OTHER POLICIES AND GUIDELINES

Instructor Availability:
In addition to office hours, but I am often available by email. If you have a specific need, I strongly encourage you to schedule an appointment with me to chat online, or meet in person. I will notify you ahead of time if I will be unavailable for an extended period of time.

I welcome students to contact me outside of class time; in person or by e-mail. If you are struggling with material or simply want more information about a topic, please contact me. Please be cognizant of the fact that I also work full-time elsewhere, and may not be available at a moment’s notice. While I will do my best to answer email messages promptly, you may not hear from me immediately.

E-mail:
E-mail is the best way to get in contact with me and I will make every effort to respond to e-mail within 24 hours during the work week. I request that you write me from your university account. Check your university e-mail regularly or arrange to have it automatically forwarded to your e-mail address of choice; you’re responsible for the information that is sent there. Please write formally when using e-mail; i.e., use punctuation, capitalization, and sign your e-mail with your name. Canvas also offers excellent communication tools.

Classroom Conduct
Our use of time is designed entirely to help you succeed in the class and to enhance learning. I will not tolerate any activities that are disruptive to other students; disruptive activity will result in dismissal. Adherence to the Student Conduct Code is expected.

Time Commitment
For many, the fact that much of this class is software-based will be challenging. While there is no way to adequately judge the specific amount of time a student will spend on each assignment due to varying technical and computer capabilities, some students will need to devote a significant amount of time outside of class to learn software, and complete exercises and projects. In the past, some students have spent as much as 10-15 hours each week working with software (myself included!). Students with previous GIS coursework (which you should have), will find some of the hands-on material to be review, but valuable practice work.

Computer Work:
PLEASE do not try to complete computer assignments at the last minute, as the hardware / software will inevitably crash just when you have an assignment due. In addition, be sure to back up your data and work. I am not likely to respond to e-mail questions for help within 24 hours before an assignment is due.

In my experience teaching computer lab-based classes, the greatest general causes for failure are 1) not doing the work in a timely manner and 2) falling behind.
Late Work Policy
The policy for late work is simply that I will not accept late work. The assignments are due at the
time indicated, which is typically midnight of the due date. After that time it will be considered
late, you will be unable to submit it, and you will not receive credit for it.

Late Work Pre-emptive Rant about Excuses and the Most Inflexible Late Work Policy
Not following this policy results in students taking advantage of me and other members of the
class who submit work on time. The assignment due date is specified when it the assignment is
given – at least a week in advance. The only excuses I will accept for late assignments are
university-sanctioned excuses for absence, which must be accompanied by documentation.
Be aware of the standard complement of unacceptable excuses—it may help you avoid
situations in which you might be inclined to use them. In rough order of popularity:

1) I had trouble with the server
2) I had trouble with the software
3) I had trouble with the data
4) I missed class and I don’t understand the assignment
5) I had trouble with my computer
6) I had trouble with the printer or my printer
7) I have too much going on / I have taken too much coursework
8) I had a flat tire / my girlfriend is moving to Atlanta tomorrow / the pipes burst in my
   apartment / my cat is sick / it’s cold / I missed my bus

I’ll be happy to help you sort through problems 1 – 6, but I won’t be able to help much the night
before the assignment is due. Working with GIS can be extremely frustrating (though eventually
the rewards far outweigh the frustration). The trick to dealing with the frustrating part is to stay
ahead of the work.

I also recognize that life happens and encourage everyone to keep their priorities straight... take
care of yourself and those who are important in your life. I understand. I have a life too! One
of the best parts of my job is getting to know students and I relish a good chat; however, please
don’t tell me your story if the report is tied to an implicit or explicit request for leniency!

Intellectual Property
This syllabus and all lectures are copyrighted 2013 to Eric Ross. Students are prohibited from
selling, or being paid by any person or commercial firm for taking notes or recording class
lectures without advance written permission of the faculty member teaching this course.
Exceptions are permitted for students with a disability who are approved in advance by
Disability Resources and Services for note taking or tape recording as an academic
accommodation.
IMPORTANT DATES AND DEADLINES
http://www.ucdenver.edu/student-services/resources/registrar/Documents/AcademicCalendars/downtown/Fall/AcademicCalendarFall2013.pdf

Academic Dishonesty
Students are expected to know, understand, and comply with the ethical standards of the University. A university’s reputation is built on a standing tradition of excellence and scholastic integrity. As members of the University of Colorado Denver academic community, faculty and students accept the responsibility to maintain the highest standards of intellectual honesty and ethical conduct.

Academic dishonesty is defined as a student’s use of unauthorized assistance with intent to deceive an instructor or other such person who may be assigned to evaluate the student’s work in meeting course and degree requirements.

Examples of academic dishonesty include, but are not limited to, the following:

A. Plagiarism: Plagiarism is the use of another person’s distinctive words or ideas without acknowledgment. Examples include:

1. Word-for-word copying of another person’s ideas or words;
2. The mosaic (the interspersing of one’s own words here and there while, in essence, copying another’s work);
3. The paraphrase (the rewriting of another’s work, yet still using their fundamental idea or theory);
4. Fabrication of references (inventing or counterfeiting sources);
5. Submission of another’s work as one’s own;
6. Neglecting quotation marks on material that is otherwise acknowledged.

Acknowledgment is not necessary when the material used is common knowledge.

B. Cheating: Cheating involves the possession, communication, or use of information, materials, notes, study aids or other devices not authorized by the instructor in an academic exercise, or communication with another person during such an exercise. Examples include:

1. Copying from another’s paper or receiving unauthorized assistance from another during an academic exercise or in the submission of academic material;
2. Using a calculator when its use has been disallowed;
3. Collaborating with another student or students during an academic exercise without the consent of the instructor.

C. Fabrication and Falsification: Fabrication involves inventing or counterfeiting information, i.e., creating results not obtained in a study or laboratory experiment. Falsification, on the other hand, involves the deliberate alteration of results to suit one’s needs in an experiment or other academic exercise.

D. Multiple Submissions: This is the submission of academic work for which academic credit has already been earned, when such submission is made without instructor authorization.
E. Misuse of Academic Materials: The misuse of academic materials includes, but is not limited to, the following:

1. Stealing or destroying library or reference materials or computer programs;
2. Stealing or destroying another student’s notes or materials, or having such materials in one’s possession without the owner’s permission;
3. Receiving assistance in locating or using sources of information in an assignment when such assistance has been forbidden by the instructor;
4. Illegitimate possession, disposition, or use of examinations or answer keys to examinations;
5. Unauthorized alteration, forgery, or falsification;
6. Unauthorized sale or purchase of examinations, papers, or assignments.

F. Complicity in Academic Dishonesty: Complicity involves knowingly contributing to another’s acts of academic dishonesty. Examples include:

1. Knowingly aiding another in any act of academic dishonesty;
2. Allowing another to copy from one’s paper for an assignment or exam;
3. Distributing test questions or information about the materials to be tested before the scheduled exercise;
4. Taking an exam or test for someone else;
5. Signing another’s name on attendance roster or on an academic exercise.

Students who fail to comply with the UC Denver Academic Ethics Policy are subject to disciplinary action as set forth by the College policy.