

University of Maryland
Department of Civil and Environmental Engineering
ENCE 301 – Geo-Metrics and GIS in Civil Engineering
Goals for Course

At the outset of the semester it is helpful to have some expectations of skills that will be learned and developed throughout a course. Nominally, this course is about using Geographic Information Systems (GIS) to perform analyses relevant to Civil Engineering. While this is certainly the main goal of the course, there are others as well. My hope is that by specifically enumerating these goals here you will know to expect them and will recognize that achieving all of these goals is an important outcome of taking this course.

The “obvious” goals:

- ***fluency in GIS concepts (data types, projections, basic programming, file structures):*** upon completing this course the student should know the difference between vector and raster data. The student should be able to project data from one coordinate system to another. The student should be able to use the GIS scripting functionality to program certain types of basic GIS manipulations. The student should know how GIS data are stored physically on the computer.
- ***ability to obtain GIS data from various internet resources:*** much of the data used in this course will be provided directly from the instructor. But a critical skill to use GIS beyond the boundaries of this course is the ability to obtain GIS data from many potential sources and be able to make sense of it.
- ***ability to create GIS-based solutions to Civil Engineering problems:*** ultimately GIS is just a tool. The purpose of this course is to give each student a good enough understanding of this tool such that it can be used by the students to answer questions that would naturally arise in a range of Civil Engineering contexts. This course has succeeded if you think of (and use) GIS to develop a solution to a problem asked **after** this course is over.

The “not-so-obvious” but equally important goals:

- ***presentation skills:*** as engineers we tend to believe that if we have the ideas and correct analyses, that’s all that matters. The effective presentation of one’s work or ideas is equally important. This course will give each of you a brief opportunity to present small GIS-related topics. Each of you will need to study for, prepare, and deliver a small presentation on GIS topics relevant to the class.
- ***ability to work with others:*** working with others is an important workplace skill, it’s also an effective way to learn. Working with others is encouraged throughout this class, but is actually required during the group project appearing during the latter part of this course. Groups will choose one of several diverse GIS projects, prepare a GIS solution to an open-ended problem, and then prepare written, oral, and web presentations about their project.
- ***critical thinking:*** How many miles of highway are there in Maryland? 10? 100? 1,000? 10,000? 100,000? 1,000,000?! Before sitting down at the GIS you should already have a sense of what number you expect. That way, when you calculate the a value by GIS you can critically evaluate whether the number makes sense. What if your original estimate of highway miles in Maryland differs considerably from the GIS estimate? Do you believe the GIS or your original estimate? How could you test what the source of the difference is? Throughout this class, I will reward students who get wrong GIS answers to homework sets but have the wherewithal to state how they know their answer is wrong. Conversely, obviously wrong answers (e.g. 10 or even 100 miles of highway in Maryland) that are not identified by students as wrong will be graded “harshly”. Always question the reasonableness of your analyses. Show me that you are thinking.