

Designing Civil Engineering 240 – Geomatics

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COURSE BACKGROUND AND GOALS

Course objective

Introduce engineering applications of surveying and geographical information systems, or GIS, to engineering students

- Fall 2015 enrollment: 28
- 3 class meetings per week (2 lectures and 1 lab)

Course goals

- Prompt students to recognize the importance of accuracy and precision in measurements, calculations, and reporting of results
- Introduce students to tools, techniques, and terminology employed by surveyors and civil engineers
- Help students understand the nature of the surveying and engineering professions

THE CHALLENGES

The course changed from “Surveying” to “Geomatics” in fall 2015. This involved...

● Reducing surveying* material by half

*applying techniques to measure and map a surface, stake boundaries, or calculate areas of plats

● Adding GIS* material

*computer mapping software

● Building a new course

I had never taught the course before and had to create it from scratch

● Building connections

Ensuring continuity between class periods and labs

● Adding active learning

I redesigned the course to build in active learning elements

COURSE CHANGES

● Objectives

Started each class by presenting objectives based on Bloom’s taxonomy.

● Course readings

Changed the course textbook and assigned preparatory readings for each class period.

● Rubrics

Implemented rubrics for exams and projects.

● Classroom space

Alternated between board and slides whenever possible and made use of available resources (Elmo, board space, etc.).

● Demos

Introduced short demos to showcase important topics and illustrate examples.

● Quizzes

Implemented short quizzes to gauge students’ understanding of the material; reviewed quizzes and explained questions in class.

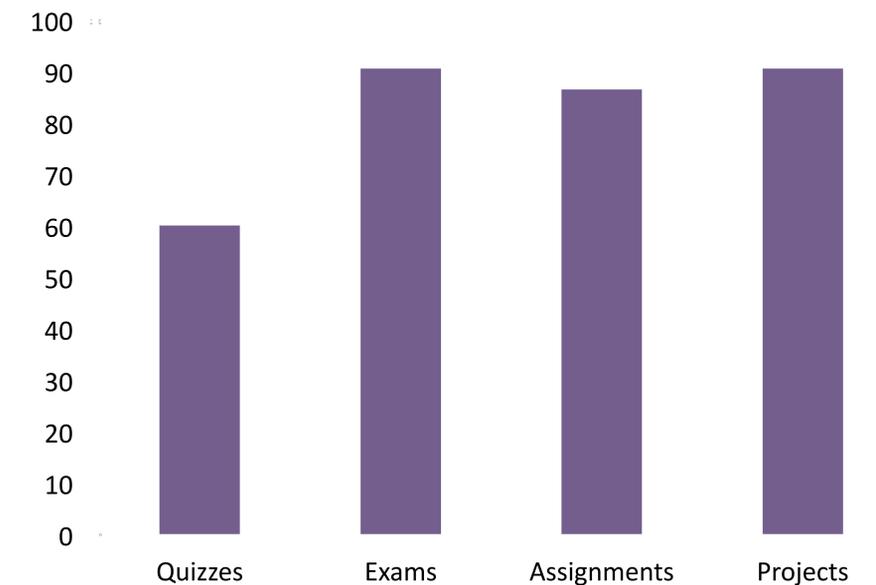
● Final project

Introduced a project on GIS where students were given the freedom to choose their own topics.

STUDENT WORK

- Student performance on **exams, projects, and assignments** was generally good. Average scores ranged from **81 to 95** out of 100 (see graph).
- Student performance on **quizzes** was lower, averaging **3/5**. I believe this was because they didn’t study the material enough, though reading assignments were generally short.

Average Student Performance



REFLECTIONS

This was a very challenging course to teach since I had never taught it before and had to design it without any prior knowledge of the course content. Despite my emphasis on active learning, the large amount of material that needed to be covered limited interactivity. The majority of students did not participate or ask questions. In the future, I will implement a point system for class participation that will be worth 5% of the final course grade. I have already implemented this in another course and am seeing positive results.

I was unhappy with the quizzes, and students were unhappy about their quiz grades. I think it would be better to offer the quizzes as extra credit or give them after we cover the material and not before (although this defies the concept of active learning).

If I teach this course again, I will also revise course materials. The GIS textbook for the lab portion of the course was tedious. I would change it with a different one. Given that this was my first time teaching the course, the material (slides, homework problems, in-class problems) also needs to be revised for more efficient use.