Geography 5223: Design and Implementation of GIS

Spring 2019

Location: Derby Hall 0135
Time: Monday and Wednesday 12:45 - 2:05 PM
Course URL: http://carmen.osu.edu

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Office Hours: Thursday 1 - 2 PM or by appointment

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This course covers fundamental design and implementation issues related to GIS development. The course is organized around a set of coding workshops and lectures. It is a project-oriented course, meaning each coding workshop will end with finishing a project using the concepts covered in that workshop, and there is also a final project. Upon completion of this course students will be able to

- understand the tasks of GIS customization,
- understand object-oriented, event-driven programming techniques,
- write code to implement GIS tools,
- put together a project to make GIS tasks more efficient and effective,
- identify and act upon ethic issues in GIS software design, and
- be familiar with basic software development processes.

Texts

The following textbook is required for this course:

- *Software Engineering*, (10th Ed.) by I. Sommerville, Addison Wesley Publishers, 2016. (Required. Rent from Amazon, or from the publisher at here)

In addition to these books, we will also use online sources, especially for ArcGIS Pro and open-source GIS development using QGIS. Detailed instructions and tutorials will be provided for the class. There are other readings materials that will be handed out during the class.

Prerequisites

Geography 5222 or consent of instructor.

Credit Hours

This class is for 3 credits.

Schedule

The detailed course schedule is presented on the front page of the Carmen site. In general, the course is roughly divided into the following topics:

Weeks 1-2: Introducing software engineering
Weeks 3-5: Python scripting for ArcGIS Pro
Weeks 6-7: Software design
Weeks 7-9: QGIS plug-ins development
Week 10: spring break
Weeks 11: Software testing
Weeks 11-15: ArcGIS Pro SDK with C#
Week 16: Presentations
Week 17: Final exam

Evaluation and Activities

The following is a breakdown of the components that will be used to evaluate student performance in this class.

- **Coding workshop exercises**. Each coding workshop consists of 4-5 sessions and at the end of each sessions there will be some reflection questions that require the completion of the coding exercises introduced in that day. These are quick turnarounds with about 1 day to finish and submit.

- **Coding workshop projects**. At the end of each workshop, there is also a project. All the workshops will be working toward a same project idea, which is based on the market share of public libraries in Franklin County. Manual calculation of the market share will introduced in the beginning of the semester. Unless otherwise announced, all workshop projects are due in a week.

- **Final project**. Students will be divided into several groups, each working on a GIS development project. The size of a group typically will not be more than 4 people. Members of each group will determine necessary working teams to fulfill different design and implementation goals of the project. Each project should be concluded by (a) delivering the final products including a full set of documents and software, and (b) professionally presenting the project to the class. During the semester, a number of formal and mandatory presentations will be given by each group to the class as progress reports. It is important for each group to deliver their product by the time specified in the course schedule. Groups that do not deliver the complete package on time will not receive any credit for the project.

- **Examination**. A comprehensive examination will be given in the finals week.

- **Quizzes**. There will be a number of in class exercises or quizzes.

The final project will be graded whole letter grades. Each of the other categories will be graded based on the percent of the total points received using the following scheme:

Category grade	Percent (%)
A	90 or higher
B	80 to 90
C	70 to 80
D	60 to 70
E	Lower than 60

A definitional grading system as listed below will be used to determine the course grade of each student. The number of letters in the "Best grades" column is the minimum number of grades that the student meets or exceeds among all categories. The course grade is the highest level the student can reach for ALL the three columns in the table. For example, assuming the first letter grade is for the project, BABBC will be a B+, CABBB will be a B, BAABC will be an A-, CAAAB will be a B, BAAAC will be an A, and AAABB (or BAAAB) will be an A.

Course grade	Best grades	Project	Minimum grade
A	AAA	B	C
A-	AA	B	C
B+	A	B	C
B	BBB	C	C
B-	BB	C	D
C+	B	C	D
C	CCC	C	D
C-	CC	C	E
D+	C	D	E
D		D	E
E			E

Important Class Policies

- **Lab computers**. The computers in the classroom will have all the software installed for this class. Every student should be able to log in any computer with their OSU name.# credentials. Please note that WE ARE NOT RESPONSIBLE FOR FILES LEFT ON LAB MACHINES. Files on the computer hard drive may be deleted at any time if needed. Students should use USB devices or Cloud storage to save their work. It is important to LOG OUT when you are done with their work.
- **Late submissions**. I will not give makeup quizzes or accept late submissions unless a good and acceptable reason is presented **prior to the due date** (in the case of a quiz, it will be before the quiz starts). Submissions after due date will no longer be accepted, unless otherwise permitted.
- **Deliverables**. All deliverables must be submitted as specified in the homework/project instructions. There will be **absolutely no email submissions**. Email submissions of work for this class will not be acknowledged and will not be accepted.
- **Do your own work**. Collaboration is healthy and often necessary, but each student should definitely finish the work individually. Please see below for more information about academic misconduct.
- **Communication**. The only official way to communicate with me and the TA is through our OSU email accounts as listed on the top of the syllabus. We cannot guarantee that we will reply messages through any other methods. We normally will reply emails in a day (except weekends or holidays).

Students with Disabilities. I would like to hear from anyone who has a disability that may require some modification of seating, testing, or other class requirements so that appropriate arrangements may be made. Please talk with me after class or during my office hours. If you need more information about disabilities and accommodations, contact the Office of Disability Services.

Policy on Plagiarism and Academic Misconduct. If I suspect that a student has committed academic misconduct

in this course, I am obligated by University Rules to report my suspicions to the Committee on Academic Misconduct. In the Code of Student Conduct, academic misconduct is defined as "any activity that tends to compromise the academic integrity of the university, or subvert the educational process"; plagiarism is defined as "the representation of another's work or ideas as one's own; it includes the unacknowledged word-for-word use and/or paraphrasing of another person's work, and/or the inappropriate unacknowledged use of another person's ideas."

Plagiarism is wrong and should be prohibited. The University has a policy on academic misconduct and plagiarism, as provided in the Code of Student Conduct. To further understand this, it is worthwhile to read the Eight Cardinal Rules of Academic Integrity at http://www.northwestern.edu/uacc/8cards.html and guidelines to avoid plagiarism at http://www.northwestern.edu/uacc/plagiar.html.