

## CONTACT INFORMATION

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Office hours: Tuesdays 4:00 to 4:30 on WebEx  
By appointment through video chat



## COURSE DESCRIPTION

This course will prepare students to use geospatial information and analyses to solve professional problems in engineering, planning and related fields. Basic GIS concepts in geospatial data structures, geodetic datums, map projections and coordinate systems, databases, topology, spatial queries/analysis, professional applications, and cartography and digital mapping will be presented. It will include learning and using GIS software including ArcGIS v10.1. The course is not intended to “fill your mind”, rather, it is intended to “open the door” to help you help yourself learn more about the topic, especially as applied to civil and environmental engineering, planning, and natural resource management decision making and problem solving.

This course is offered on-line through three components. The first is the scheduled on-line class through WebEx which requires participation by students at the specified time each week. This time is used for lecture and discussions, answering questions, and discussion of assignments. The second component is ESRI’s virtual course, “Learning ArcGIS Desktop”. Each student will be given a unique access code and will be responsible for completing specific sections before each class as indicated in the schedule. This provides the hands-on learning of the GIS software. The third component consists of Wiki interactions. Periodically through the semester, an article, website, application, or similar will be posted on the Scholar Wiki site and students will be required to critique what has been provided as described under the Grading section below according to a defined timeline which is established as each activity is posted.

## TEXTS / RESOURCES

### Required Text:

1. [An Introductory Textbook on Geographic Information Systems](#). M. Schmandt, [GIS Commons](#) (<http://giscommons.org/>), (GISCommons)

If you want more hands-on practice, a recommended text is provided below. This book consists of tutorials (and the necessary data) for hands-on experience with ArcGIS.

2. Getting to Know ArcGIS Desktop, 3rd Edition for ArcGIS10.1, ISBN 978-1-58948-308-8, ESRI Press, Tim Ormsby et al., 2013.

### Required for on-line course:

1. Access to a computer with a sound card (and, preferably a camera)
2. You MUST have a headset with microphone for the WebEx-based class (<http://www.logitech.com/en-us/webcam-communications/internet-headsets-phones>). I recommend getting one with a full headset (not just a single ear piece). Make sure it includes a microphone and for those with a Mac, a USB connection. Any gaming headset works well. Prices range from about \$30 to \$\$\$.

### Required Software:

1. ArcGIS 10.1 Desktop. A 1-year license is available at no charge to enrolled students from Campus Software (<http://www.ita.vt.edu/studentsoftware/website/>). ArcGIS 10.1 is available in the GIS lab in Alexandria, and in the Library and computer lab, NVC in Falls Church.
2. WebEx client-side software. This is downloaded when you log in to WebEx and run the System Check for the first time.

### Course Websites:

1. <http://www.webex.com/> for WebEx, the on-line classroom. For students enrolled in UAP 5114, the course is referenced as CEE5204-GIS\_Applications\_in\_CEE-F12-Hancock (Tues 4:00-7:00p).
2. <https://scholar.vt.edu/> for Scholar. Course management including course documents, assignments, quizzes, grade book, and course Wiki for interactive assignment input.
3. [http://training.esri.com/acb2000/showdetl.cfm?DID=6&Product\\_ID=977](http://training.esri.com/acb2000/showdetl.cfm?DID=6&Product_ID=977) for ESRI's Virtual Course on "Learning ArcGIS Desktop". Each student will be given a unique code to access this course at no charge.
4. (optional) [http://training.esri.com/acb2000/showdetl.cfm?DID=6&Product\\_ID=976](http://training.esri.com/acb2000/showdetl.cfm?DID=6&Product_ID=976) for "Getting Started with GIS". This is a free introductory on-line tutorial.

### GRADING

Your final grade will be determined as follows:

- a. 5%: WebEx class participation
  - b. 10%: ESRI's Virtual Course "Learning ArcGIS Desktop"
  - c. 25%: Wiki Assignments
  - d. 20%: Individual Assignments
  - e. 20%: Exam/Quizzes
  - f. ~~20%~~: Group Project
- 100% TOTAL
- a. CLASS PARTICIPATION: Student attendance during the WebEx class is strongly encouraged as this course is designed for active participation of everyone in class. In-class activities can include on-line surveys, group breakouts, application sharing, and student direction. Grades will be determined as satisfactory or unsatisfactory based on participation.
  - b. ON-LINE TUTORIAL: Students will submit the final certificate of completion for ESRI's virtual course "Learning ArcGIS Desktop". Student progress with the modules is tracked on the ESRI site. Students will receive 1% for timely completion of each module or 1/2% for late completion of each module. An additional 2% will be given upon submission of the Certificate of Completion of the virtual course by the established date.
  - c. WIKI ASSIGNMENTS: Articles, websites, applications, maps, or other features will be posted/linked to the Scholar Wiki site periodically during the semester along with a list of questions and a timeline. One student per question will be assigned the lead for that question and will be required to provide the initial response to that question by the specified time on the Wiki page. After that time, students will be required to add to/modify comments to their specified questions by the established due date. Finally, one student--the summarizer--will review all questions for the completed wiki and give a brief 5-minute summary of the responses at the beginning of the next class. Students will have a single assignment, either initial responder, responder to two questions, or summarizer for each Wiki assignment. Grades will be awarded as Excellent, Good, Average, or Unacceptable based on appropriateness and thoughtfulness of responses. A zero will be assigned for non-responses. If an assigned student fails to provide an initial response before the deadline, that student will receive a zero for that Wiki and the first student to respond after the initial response deadline will receive extra credit in addition to the grade for that Wiki.
  - d. INDIVIDUAL ASSIGNMENTS: Assignments will be assigned during Centra class and posted on Scholar to be turned in to the Scholar Assignment folder before the following class as specified in the assignment memo. Students must turn in a SINGLE document either as a Word file or an Adobe pdf file to the Assignments folder in Scholar. Grades will be based on (1) demonstrated effective use of geospatial

techniques and analyses and (2) written and geospatial presentation skills.

- e. **EXAM / QUIZES:** The exam is a take-home project-based exam, due at the beginning of the next class after it is posted. It will consist of a series of geospatial analysis problems. Grades will be based on completeness, practicality, implementability, and presentation, as well as a demonstrated understanding of limitations of the software and analysis techniques. You may use any non-living resources that you have acquired or identified. You will be required to include a statement at the beginning of your exam that specifically states that the work being submitted is yours and yours alone.

You should anticipate a quiz every week, which will be available before and after the Centra class. Each quiz will be focused on terminology and concepts. Quizzes will be worth 33% and the exam will be worth 67% of this part of your grade.

- f. **GROUP PROJECT:** You are required to work in groups of two or three. Grades will be based on your (1) ability to complete the assigned project using geospatial analysis techniques, and (2) clarity of written, cartographic, and oral presentations. The final project will include an oral discussion during the final WebEx class. The same grade will be assigned to each member of the group.

Note that assignments and projects will only be credited when submitted ON TIME! Late assignments will be graded with a substantial penalty unless a proven emergency occurs. All submissions should be submitted electronically as a single Word or pdf file using the Assignments link in Scholar.

## HONOR CODE

The Virginia Tech Graduate Honor System is in effect for this course and all assignments, projects, quizzes, and tests shall be subject to the stipulations of the Graduate Honor Code which is located online at <http://ghs.graduateschool.vt.edu/>. Please read this document and make sure that you understand your responsibilities as a student and the potential violations of the Graduate Honor Code: Cheating, Plagiarism, Falsification, and Academic Sabotage. Plagiarism or other violations will not be tolerated. In particular, guidelines on how to avoid plagiarism are located online at <http://ghs.graduateschool.vt.edu/student/avoiding.html>. Please contact Professor Hancock at any time if you have questions about the Graduate Honor System at Virginia Tech.

## PRINCIPLES OF COMMUNITY

Virginia Tech is a public land-grant university, committed to teaching and learning, research, and outreach to the Commonwealth of Virginia, the nation, and the world community. Learning from the experiences that shape Virginia Tech as an institution, we acknowledge those aspects of our legacy that reflected bias and exclusion. Therefore, we adopt and practice the following principles as fundamental to our on-going efforts to increase access and inclusion and to create a community that nurtures learning and growth for all of its members:

- We affirm the inherent dignity and value of every person and strive to maintain a climate for work and learning based on mutual respect and understanding.
- We affirm the right of each person to express thoughts and opinions freely. We encourage open expression within a climate of civility, sensitivity, and mutual respect.
- We affirm the value of human diversity because it enriches our lives and the University. We acknowledge and respect our differences while affirming our common humanity.
- We reject all forms of prejudice and discrimination, including those based on age, color, disability, gender, national origin, political affiliation, race, religion, sexual orientation, and veteran status. We take individual and collective responsibility for helping to eliminate bias and discrimination and for increasing our own understanding of these issues through education, training, and interaction with others.
- We pledge our collective commitment to these principles in the spirit of the Virginia Tech motto of Ut Prosim (That I May Serve).

## TENTATIVE SCHEDULE

Updated: 8/1

Week	Topics	Tutorial Session	Required Readings	WIKI
1	<u>Introduction</u> : Syllabus, WebEx use and other websites, Introduction to GIS Concepts		GISCommons: Ch 1	GeospatialRevolution Video
2	<u>Introduction</u> : Maps, Cartography and Visualization	ESRI Module 1: Getting started	GISCommons: Ch 6	Maps
3	<u>Geospatial Data and Data Models</u> : Coordinate Systems and Projections, State Plane Coordinates, PLSS, Geodesy	ESRI Module 2: Creating Symbology	GISCommons: Ch 3 - "Earth"	
4	<u>Geospatial Data and Data Models</u> : Data structures, relational database design, geodatabase design, accuracy & precision, Metadata, Standards, Data sources	ESRI Module 3: Referencing Data to Real Locations	GISCommons: Ch 2	Data Quality
5	<u>Geospatial Data and Data Models</u> : Topology, cleanup, simplification, GPS, digitizing, georeferencing, Imagery	ESRI Module 4: Organizing Geographic Data	GISCommons: Ch 3 - "Map Preprocessing"	
6	<u>Geospatial Data and Data Models</u> : database management, attribute management, joining & relating tables, geocoding	ESRI Module 5: Creating and Editing Data	GISCommons: Ch 4	Web Applications
7	NO WebEX CLASS	ESRI Module 6: GIS Analysis		
8	<u>Geospatial Analysis</u> : Querying data, Locational queries, Classification	ESRI Module 7: Geoprocessing and Modeling	GISCommons: Ch 5	Paper on Geospatial Analysis
9	<u>Geospatial Analysis</u> : Vector Analysis, Buffering, Overlays	ESRI Module 8: Designing Maps	GISCommons: Ch 5	
10	<u>Geospatial Analysis</u> : Raster Basics and Analysis, Grid Analysis		GISCommons: Ch 5	
11	<u>Geospatial Analysis</u> : Review for Test  <b>TEST</b>			

12	<p><b>PROJECT ASSIGNMENT</b></p> <p>Project description, project steps, data preparation, limitations, uncertainty.</p> <p><u>Geospatial Analysis</u>: Terrain Modeling, TINS, DEMS</p>		On Scholar	Paper on Advanced Geospatial Analysis
	Thanksgiving			
13	<p>Project questions</p> <p><u>Geospatial Analysis</u>: Arc Scene, Google Earth</p>			
14	<p><u>Geospatial Analysis</u>: Geocoding, Network Analysis, Dynamic Segmentation</p> <p>Analysis Technics related to project, Project questions</p>		On Scholar	
15	Project due, Project Presentations and Discussion			