



Course Title

ENVS 591: Advanced Spatial Analysis

Course Overview

This course will focus on the use of spatial tools to develop hydrologic models. Students will use ArcGIS Pro, ArcGIS, and other software, to determine stream flow and basin morphology characteristics. Students will learn to derive watersheds and conduct landscape assessments using the ArcGIS environment. Students will learn about selection of proper input datasets and processing needed for data preparation, and the use of a variety of the Spatial Analyst toolset. Students will finish the semester learning project management techniques to scope an analytical spatial project, then conduct a hydrologic modeling exercise based on a real world project.

Logistics

Course Instructor: Professor Jennifer Ciminelli, s2jmcimi@vcu.edu

Office Hours: Monday 10 – 11:00, Tuesday 10:00 – 12:00 and by appointment. Office is located in Trani Life Sciences room 104C.

Instructor Contact Information: Students may drop in during open office hours, or email to set up an appointment.

Course Goals & Learning Objectives

At the successful completion of this course, you will have an understanding and capability to:

- Employ project management techniques for project development and implementation
- Download, process, classify and interpret spatial raster datasets
- Analyze spatial raster and vector datasets in the ArcGIS environment
- Conduct hydrologic and watershed modeling using ArcGIS (ArcPro and ArcMap)
- Conduct landscape scale characterization assessments in the GIS environment

Required Materials

All materials for this course are presented through {Blackboard/Rampage}. In order to access these materials, you must use your VCU eID and password.

Assignments & Grading Policy

Your overall grade in this class will be determined by a combination of the following items:

- **Discussion/Participation/Attendance** (10 % of the course grade). Your performance in this class will be influenced by your participation and attendance in class.
- **Class Exercises** (30% of the course grade). Each class will have a class exercise to drive the work session portion of the class period.
- **Homework Assignments** (15% of the course grade). There will be 6 homework assignments in this course based upon a combination of the use of skills developed from in class topics and online tutorials. The due date for each of these assignments is denoted in the course calendar (see below).

- **Exams** (10% of the course grade). The semester will have two exams, each worth 10% of the course grade.
- **Class Project** (25% of the course grade). The class will work on a real world watershed scale assessment during the course of the semester. Final results will be presented on the final exam day and delivered to our client. Student participation and work on the final project will be graded according to the course grading rubric.

At the end of the semester, your final grade will be estimated using the percentages outlined above. Final grades will be assigned based upon the following categories: 90-100% A, 80-89% B, 70-79% C, 60-69% D, < 60% F.

Schedule of Topics

The table below outlines the order of topics and timing for all evaluated content and exams.

Week	Topic	Resources
1	Introduction to stream and basin morphology concepts Assignment 1: GIS tutorial review	All resources needed will be provided to students on blackboard and include appropriate readings, help documentation and lecture notes.
2	Data & the GIS Environment <i>Class 1 exercise due</i> <i>Assignment 1 exercise due</i> Assignment 2: Review papers on hydrologic and watershed modeling	
3	Stepping in to Hydrologic Modeling <i>Class 2 exercise due</i>	
4	Delineating the Watershed <i>Class 3 exercise due</i> Assignment 3: Basin morphology basics and GIS data preparation tasks for class 5	
5	Basin Morphology <i>Class 4 exercise due</i> <i>Assignment 3 due</i>	

	Assignment 4: Downloading and preparing base layers for class 6	
6	Landscape Characterization <i>Class 5 exercise due</i>	
7	TEST 1	
8	Swamp GIS and the Big Project Guest lecture from DEQ client <i>Class 6 exercise due</i>	
9	Project Mapping	
10	Downloading and processing the base DEM data <i>Class 9 exercise due</i>	
11	Delineating hydrologic data (flow, accumulation and stream network) and delineating the watershed <i>Class 10 exercise due</i> Assignment 5: Cost distance and path analysis tutorial. GIS data prep for class 12.	
12	Using path and cost distance analysis to refine delineation of stream flow and watershed boundaries <i>Class 11 exercise due</i> <i>Assignment 5 due</i>	
13	Conducting the landscape assessment <i>Class 12 exercise due</i> Assignment 6: ArcGIS online tutorials	
14	Finalizing output. Learning how to create appropriate communication elements as part of the project deliverable using ArcGIS Online. <i>Class 13 exercise due</i> <i>Assignment 6 due</i>	

15	Test 2	
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Late Policy

You are expected to turn in all work on time, as outlined in the schedule above; however, late completions are possible if arranged *beforehand* or in the case of *documented illness or emergency*. Class exercises and assignments are due as assigned. Failure to submit by the due date will result in a 10 point deduction. Failure to submit the second day after the due date will result in a 20 point deduction. Failure to submit by the third day after the due date will result in a score of zero.

VCU Policies

Campus emergency information

Sign up to receive at alert.vcu.edu/signup/. It is essential to keep your information up-to-date within VCU Alert and to keep your permanent address and emergency contact information current in eServices.

VCU uses a variety of communication methods to alert the campus community about emergency situations and safety threats. Learn more about types of alerts at alert.vcu.edu/know/typesofalerts.php

Know the emergency phone number for the VCU Police (828-1234), and report suspicious activities and objects.

Class registration required for attendance

Students may attend only those classes for which they have registered. Faculty may not add students to class rosters or Blackboard. If students are attending a class for which they have not registered, they must stop attending.

Honor System: upholding academic integrity

The VCU Honor System policy describes the responsibilities of students, faculty and administration in upholding academic integrity. According to this policy, "Members of the academic community are required to conduct themselves in accordance with the highest standards of academic honesty, ethics and integrity at all times." Students are expected to read the policy in full and learn about requirements here: <https://conduct.students.vcu.edu/vcu-honor-system/>

Important dates

Important dates for the semester are listed in the VCU Academic Calendar:

<https://academiccalendars.vcu.edu/>

We care about your success!

Virginia Commonwealth University has launched an Early Alert initiative to support student success. As your professor, if I am concerned about your academic performance in the first few weeks of this class, you and your academic advisor may receive a Progress Report email with links to appropriate academic support resources. You are encouraged to reach out to me after class or during my office hours for additional support. Your academic advisor, the Writing Center, and the Campus Learning Center may also follow up to provide additional layers of support to you.

Attendance and consequences of poor attendance

The instructional programs at VCU are based upon a series of class meetings involving lectures, discussions, field experiences, special readings and reporting assignments. Therefore it is important for each student to be in attendance on a regular basis. A student who misses a class session is responsible for completing all material covered or assignments made during the absence.

Students having attendance problems should contact their instructor to explain the reasons for nonattendance and to discuss the feasibility of continuing in the course. If the student has fallen so far behind that the successful completion of the course is impossible, the student should withdraw from the course before the end of the first 10 weeks of classes.

If the student continues to miss class and does not officially withdraw from the course, the instructor may withdraw the student for nonattendance with a mark of W before the end of the first 10 weeks of classes or may assign an academic grade at the end. Withdrawals are not permitted after the end of the first 10 weeks of classes. For classes that do not conform to the semester calendar, the final withdrawal date occurs when half of the course has been completed. Withdrawal dates for summer session classes are provided on the [Summer Studies calendar](#).

Career Services

Looking for ways to tie what you are learning in your class to your future career or professional goals? VCU Career Services provides career planning services for all current VCU students and alumni. Career Services can help students with finding a work-study job on/off campus, resume

writing, internship development, interviewing, preparing for graduate school, networking, or job searching. Students are invited to attend career events and workshops, and schedule individualized career advising appointments. Career Services is located on the ground floor of University Commons, in room 143. For more information and to make a career advising appointment, [visit the VCU Career Services website](#).

Managing stress

Students may experience situations or challenges that can interfere with learning and interpersonal functioning including stress, anxiety, depression, alcohol and/or other drug use, concern for a friend or family member, loss, sleep difficulties, feeling hopeless or relationship problems. There are numerous campus resources available to students including University Counseling Services (804-828-6200 MPC Campus, 804-828-3964 MCV Campus), University Student Health Services (MPC 804 828-8828, MCV Campus 804 828-9220) and the Wellness Resource Center (804-828-9355). 24 hour emergency mental health support is available by calling 828-1234 and asking to speak to the on-call therapist or utilizing the National Suicide Prevention Lifeline (1-800-784-2433).

Mandatory responsibility of faculty members to report incidents of sexual misconduct
All employees, including faculty, department chairs and deans, are required to report any incidents of sexual assault, sexual exploitation and partner or relationship violence to the university's Title IX Coordinator.

Confidential offices which can provide support at VCU are: University Counseling Services (804) 828-6200

For more information about Title IX, please visit please visit <https://equity.vcu.edu/>.

Military short-term training or deployment

If military students receive orders for short-term training or for deployment/mobilization, they should inform and present their orders to Military Student Services and to their professor(s). For further information on policies and procedures contact Military Student Services at 828-5993 or access the corresponding policies.

Student email standard

Email is considered an official method for communication at VCU. Students are expected to check their official VCU email on a frequent and consistent basis (the university recommends daily) in order to remain informed of university-related communications. Students are responsible for the consequences of not reading, in a timely fashion, university-related communications sent to their official VCU student email account. Mail sent to the VCU email

address may include notification of university-related actions, including disciplinary action. Students must read this standard in its entirety at <https://ts.vcu.edu/media/technology-services/content-assets/university-resources/ts-groups/information-security/StudentEmailStandard.pdf>

Student financial responsibility

Students assume the responsibility of full payment of tuition and fees generated from their registration, all charges for housing and dining services and other applicable miscellaneous charges. Students are ultimately responsible for any unpaid balance on their account as a result of the University Financial Aid Office or their third party sponsor canceling or reducing their award(s).

Students representing the university - excused absences

Students who represent the university (athletes and others) do not choose their schedules. All student athletes should provide their schedules to their instructors at the beginning of the semester. The Intercollegiate Athletic Council strongly encourages faculty to treat missed classes or exams (because of a scheduling conflict) as excused absences and urges faculty to work with the students to make up the work or exam.

Students with disabilities

Section 504 of the Rehabilitation Act of 1973 and the Americans with Disabilities Act of 1990, as amended, require that VCU provide "academic adjustments" or "reasonable accommodations" to any student who has a physical or mental impairment that substantially limits a major life activity. To receive accommodations, students must register with the Office of Student Accessibility and Educational Opportunity on the Monroe Park Campus (828-2253) or the Division for Academic Success on the MCV campus (828-9782). Please also visit the Student Accessibility and Educational Opportunity website via <https://saeo.vcu.edu/> and/or the Division for Academic Success website via <https://das.vcu.edu/> for additional information.

Once students have completed the registration process, they should schedule a meeting with their instructor (s) and provide their instructor (s) with an official accommodation letter. Students should follow this procedure for all courses in the academic semester.

Withdrawal from classes

Before withdrawing from classes, students should consult their instructor as well as other appropriate university offices. Withdrawing from classes may negatively impact a student's financial aid award and his or her semester charges. To discuss financial aid and the student

bill, visit the Student Services Center at 1015 Floyd Avenue (Harris Hall) and/or contact your financial aid counselor regarding the impact on your financial aid.

Faculty communication about students

VCU instructional faculty, administrators and staff maintain confidentiality of student records and disclose information in accordance with the Family Educational Rights and Privacy Act (FERPA). This means that VCU officials may disclose student record information without the consent of the student in certain situations. To support university operations, for example, VCU officials share information about students with other educational officials as necessary to perform their job duties. FERPA permits this disclosure to school officials who have a legitimate educational interest in the student information. In addition, VCU officials have obligations to report information shared by a student depending on the content of that information, for example, in compliance with VCU's policy on the duty to report. Unless FERPA permits a certain disclosure, VCU generally requires consent from a student to disclose information from their education record to another individual. You may find additional information on the VCU FERPA website: <http://rar.vcu.edu/records/family-educational-rights-and-privacy-act/>.

Disclaimer

Note that the specifics of this Course Syllabus may be changed at any time during the semester. You will be responsible for abiding by any such changes that are communicated to you via email, course announcement, and/or posting in the course discussion forums.