

## COURSE INFORMATION

**Title:** Introduction to Geographic Information Systems (Intro to GIS)

**Term:** Summer 2012

**Course designation:** NR 143 OL1 (60161)

**Course dates/times:** Online from May 21 – June 29

## INSTRUCTOR

### CONTACT INFORMATION

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**Twitter:** [@jarlathond](https://twitter.com/jarlathond)

### BIOGRAPHY

Jarlath O'Neil-Dunne is a geospatial analyst with the University of Vermont's (UVM) Spatial Analysis Laboratory. Over the years his research has focused on the application of geospatial technology to a broad range of natural resource related issues such as environmental justice, wildlife habitat mapping, high-elevation forest decline, land cover change detection, community health, and water quality modeling. Most recently his work has centered on urban ecosystems. The results of his urban tree canopy assessments have been used by communities across the US and Canada to establish tree canopy goals. In addition to his research duties Jarlath teaches introductory and advanced courses in geospatial technology. He also oversees the university's ESRI Development Center and eCognition Center of Excellence.

Jarlath earned a Bachelor of Science in Forestry from the University of New Hampshire, a Masters of Science in Water Resources from the University of Vermont, and certificates in hyperspectral image exploitation and joint GIS operations from the National Geospatial Intelligence College. For over a decade he served as an officer in the United States Marine Corps (active & reserve) with tours in East Africa, the Middle East, and East Asia. During the early stages of Operation Iraqi Freedom he co-directed the Marine Corps' imagery intelligence assets.

Jarlath is the recipient of the Vermont Spatial Data Partnership's 2008 Outstanding Achievement Award, a member of the team recognized with the New York State GIS Partnership Award in 2008, and co-recipient of the US Forest Service Northern Research Station's 2010 award for Excellence in Science and Technology.

## INSTRUCTION

### OVERVIEW AND OBJECTIVES

This course will introduce you to Geographic Information Systems (GIS). GIS is more than software, to use the technology to its full potential requires a strong foundation in geoinformatics science. This purpose of this class is

to give you the theoretical foundation and applied knowledge necessary to understanding the uses (and misuses) of GIS. Lectures and readings will be the means by which you will build that foundation. Virtual training will be employed to help you gain the necessary technical expertise in GIS software. Assignments will provide you the opportunity to apply the principals and practices of GIS to address issues and solve problems.

## PREREQUISITES

It is recommended that students taking this course have some experience with geospatial technology, preferably though a course such as NR 25 (Measurements and Mapping) or GEOG 81 (Geotechniques). A working knowledge of computer hardware and software is required.

## FORMAT

This course will be delivered online. You could check the course content on [Blackboard](#) daily. The advantage of the online medium is that you can “attend class” at your leisure. The disadvantage is that is easy to put off work. Depending on the subject matter and assignments you should plan to spend 1-4 hours per day viewing lectures, reading materials, working through the assignments.

## MATERIALS

### BLACKBOARD

The course will be delivered through [UVM’s Blackboard portal](#). The course materials will be available 24 hours before the course begins, but will be updated throughout the semester.

### TEXTBOOKS

This course will primarily make use of online materials. Although is note required students are encouraged to purchase *The ESRI Guide to GIS Analysis, Volume 1*. The book can be purchased through online book retailers such as Amazon, Barnes & Noble, and Borders. They are also available though the ESRI online store.

[The ESRI Guide to GIS Analysis, Volume 1](#) (EGGA)

### ONLINE TRAINING

The course will make use of interactive online training materials developed by the Environmental Systems Research Institute (ESRI). These courses will be made available to you at no charge through a special arrangement. DO NOT purchase them through the ESRI Training and Education gateway; course access codes will be provided to you by the instructor.

[Learning ArcGIS Desktop](#) (LAD)

### SOFTWARE

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### ARCGIS 10

The majority of work in the course will be performed using the ArcGIS software package developed by ESRI.

**Installation:** The instructor will provide you with a copy of the student edition for ArcGIS 10 for installation on your personal computer. You will need to provide the instructor with your current mailing address. Please note that the license agreement allows you to use ArcGIS for educational purposes only. When installing the software please insure that you choose to perform a **COMPLETE** install, which includes all extensions.

**Hardware requirements:** In general, you will need a computer running the Windows operating system and at least 2GB of RAM. Please refer to [ArcGIS system requirements page](#) for more detailed information. If you have a Macintosh you can run Windows via [Boot Camp](#), [VMware Fusion](#), or [Parallels](#). Please note that all of these options require that you purchase a valid copy of Windows.

Most computer labs on campus are still running an old version of ArcGIS (9.3). You may find compatibility issues if you attempt to use a computer running ArcGIS 9.x or earlier to complete assignments.

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## VPN

The [Virtual Private Network \(VPN\)](#) allows you to function as if your computer were connected to the UVM network from off-campus. When connected via VPN you can also map to your Zoo drive from home - [\\zoofiles\netid](#) ("netid" is your UVM network ID). Direct mapping of your drive is only recommend if you have a fast Internet connection. However, the size of most GIS datasets will make it impossible for you to perform GIS tasks on data stored on your Zoo drive.

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## GOOGLE EARTH

Google Earth will be employed for a variety of introductory exercises. The most recent version can be downloaded from the [Google Earth web site](#).

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## WINSCP/FETCH

WinSCP provides a means by which to access your UVM files on Zoo (zoo.uvm.edu) from your personal computer while off-campus. WinSCP can be obtained from the [UVM software page](#). For Macintosh operating systems you should download Fetch, which can also be obtained from the [UVM software page](#).

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## WEB BROWSER

[Firefox 8+](#), or [Internet Explorer 8+](#)

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## ACCOUNTS

Your UVM account will provide you with access to the course materials on [Blackboard](#). You will need an [ESRI Global Account](#) to access the ESRI Virtual Campus courses. Certain exercises and assignments will make use of Google Maps and Google Docs, functionality that requires a [Google/Gmail account](#).

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## POLICIES

## ACADEMIC INTEGRITY

Please insure you adhere to the UVM [Code of Academic Integrity](#). Unless told otherwise, all work in this course should be done independently.

## COMMUNICATION

All communication will be done through Blackboard announcements or UVM email ([youraccount@uvm.edu](mailto:youraccount@uvm.edu)). Please check both on a daily basis for the duration of the course. You should feel free to contact the instructor via email, office phone (9AM-5PM), or cell phone (7AM-8PM). It can be difficult to solve some GIS workflow and software questions via phone or email. In these instances your instructor will employ [Go To Meeting](#) to enable screen sharing through your web browser.

## GETTING HELP

The primary means of asking questions should be through the discussion forums on the course Blackboard page. Chances are if you have a question, someone else has the same one. The exception to this policy is if your question is personal in nature (e.g. about the grade you received for a particular assignment) or if your question would give away the answer to an assignment. If the discussion forum is not a suitable means by which to resolve your issue you should email the instructor. If warranted, your instructor will arrange a time to review your question over the phone using Go To Meeting. Go To Meeting is a web conferencing solution that allows for desktop screen sharing. The instructor will also schedule Go To Meeting sessions for the entire class to attend depending on the need.

## DATA STORAGE

Data backups are a fundamental part of any GIS operation. Data should never be stored solely on your computer's hard drive. You are required to maintain backups of all of your work, preferably using the space allocated on your Zoo drive provided to you by UVM. Data backups should occur once per day, at a minimum.

## GRADING

Grades are awarded in three major categories: 1) participation (primarily discussion forums), 2) completing the ESRI Virtual Campus Course, Learning ArcGIS Desktop, 3) completing lab assignments, and 4) responses to instructor directed assignments. Grades for late assignments will be reduced by 20% per day, thus the maximum score on an assignment worth one point that is turned in a day late would be 0.8 points.

Type	Points	Percentage
Participation	9	9%
Learning ArcGIS Desktop	16	16%
Module 1	2	2%
Module 2	2	2%
Module 3	2	2%
Module 4	2	2%
Module 5	2	2%

Module 6	2	2%
Module 7	2	2%
Module 8	2	2%
<b>Labs</b>	<b>45</b>	<b>45%</b>
Lab 1	5	5%
Lab 2	5	5%
Lab 3	5	5%
Lab 4	5	5%
Lab 5	5	5%
Lab 6	5	5%
Lab 7	5	5%
Lab 8	5	5%
Lab 9	5	5%
<b>Instructor directed</b>	<b>30</b>	<b>30%</b>
IDA #1	6	6%
IDA #2	6	6%
IDA #3	6	6%
IDA #4	6	6%
IDA #5	6	6%
<b>Total</b>	<b>100</b>	<b>100%</b>

## OUTLINE

The course lecture and instructional materials are divided into six sections. Each section is devoted to a central topic. Lectures, videos, and readings are used to provide the theoretical foundation and provide examples. Technical training, via the ESRI Virtual Campus, is to be conducted concurrently with the sections. The purpose of the Virtual Campus courses is to build technical competence using desktop GIS software.

## SECTIONS

### 1: WHAT IS GIS?

- Components of a GIS
- Examples of GIS and applications
- History of GIS
- Contemporary issues in GIS
- GIS basics

### 2: PROJECTIONS AND COORDINATE SYSTEMS

- Distortion
- Latitude & longitude

- Projection families

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### 3: DATA STRUCTURES AND REPRESENTATION

- Databases
- Entities and fields
- Attribute queries
- Data models – vector, raster, TIN
- Topology
- Data display – discrete, continuous
- Choropleth mapping
- Cartograms

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### 4: DATA SOURCES

- Collected data
- Derived data
- Sensed data
- Sources of error

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### 5: SPATIAL ANALYSIS & GEOPROCESSING

- Proximity
- Density
- Overlay
- Raster operations / map algebra
- Connectivity (networks)

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### 6: DATA QUALITY AND LOOKING FORWARD

- Metadata
- Error and uncertainty
- Neogeography and the GeoWeb
- Future of GIS
- Careers

## SCHEDULE

The schedule is designed to give you an approximate idea of what you should be working on and when. The schedule below is only presented as a guide. Please note that the schedule should not be used as a reference for assignment due dates, **ALWAYS refer to Blackboard for assignment due dates**. LAD = Learning ArcGIS Desktop. IDA = Instructor Directed Assignments. Labs = Laboratory Assignments.

Week	Section	LAD	IDA	Labs
1	1			
			IDA #1	
			IDA #2	
			IDA #3	
			IDA #4	
2	2	Module 1		
		Module 2		
	3	Module 3		
3	4	Module 4		
		Module 5		
	5	Module 6		
4	5		IDA #5	
				Lab #1
				Lab #2
				Lab #3
5	6			Lab #4
				Lab #5
				Lab #6
				Lab #7
6				
				Lab #8
				Lab #9