EVPP 430-001 and 505-006:
Fundamentals of Environmental Geographical Information Science

Instructor: Vivek Prasad, PhD

Course Meets: Tuesday and Thursday 7:30-8:45 AM, Innovation Hall 327

EVPP 430-001 and EVPP 505-006 co-meet

To Contact Instructor

Office: DK 3026
Office hours: Tuesday: 9:00 am – 9:30 am or by appointment
E-Mail: vprasad1@gmu.edu (preferred), similarly, you use your GMU email to communicate with me.
Department Main Office: GMU Environmental Science and Policy Department: DK 3005
Telephone: 703-993-1043

Course descriptions:

Geographic Information Science (GIS) has emerged as a powerful data visualization and analysis discipline. This course investigates how GIS is currently being used to understand better and address environmental problems, as well as manage and conserve natural resources. The lectures discuss the basic and current applications of GIS in the environmental dataset, maps, modeling, and analysis and impediments to GIS. Environmental GIS dataset deals with several applications, from the simple Digital Elevation Model to the Landuse Land-change, or Solar Analysis. Specific topics include climate change, biodiversity conservation, forest management, soils management, agriculture, natural hazards, water resources, environmental challenges in the urban environment, and alternative energy. The lectures in this course summarize recent progress and identify key research issues concerning the integration of GIS and environmental dataset. Students will have the opportunity to conduct their independent research or work on case studies relevant to the course topics, using GIS data.

Course objectives:
1. Describe how GIS deals with environmental problems,
2. An integrated approach with the geodatabase,
4. Discuss the role of GIS in environmental applications,
5. Describe the current GIS environment and topics of current interest in sustainable energy,
3. Present a project using a GIS.

Gradebook:

	Assignments	Grade
1	Literature review (# 4)	10
2	Home work (# 8)	50
3	Mid-term exam	10
4	Final project and presentation	20
5	Class participation	10

Grading Scale

A+	97 - 100%		C+	77 - 79%
A	93 - 96%		C	73 - 76%
A-	90 - 92%		C-	70 - 72%
B+	87 - 89%		D	60 - 69%
B	83 - 86%			
B-	80 - 82%		F	<60%

Reading and other materials:

1. The 20 Essential Skills. Gina Clemmer. Second Edition (you can buy a used book)

2. Journal articles, documents, and required data will be provided during the course.
3. Students are required to have a more than 16 GB USB for data and lab project storage and retrieval.

4. ArcGIS 10.5 software (evaluation copy from ESRI) will be provided at the class. You should install it on your computer.

Academic Integrity (Plagiarism)

All assignment submitted for this class must be original; i.e., it must be your work and your work alone. You must not simply cut-and-paste the work of others into your work, nor should you paraphrase existing work. I don't allow students to reuse their work from previous semester (s), please discuss with me if you have any concern or question on this. Be warned: Plagiarism (defined below) will not be tolerated. Plagiarism is a GMU Honor Code violation that will have a serious impact on your academic record. See more information on GMU's Honor System and

Code regarding plagiarism at http://oai.gmu.edu/mason-honor-code/?preview_id=39&preview_nonce=d3e5145d99&_thumbnail_id=-1&preview=true

Attendance and Absence from Class

Attendance at class meetings is required and is essential for a high grade for class participation. You must take notes of all material presented or discussed in class. Students must contact the instructor before any planned absence (for example, religious holidays, see http://ulife.gmu.edu/calendar/religious-holiday-calendar/) and they should make every effort to inform the instructor if unforeseen circumstances require missing the scheduled class. Absence from class without prior notification will result in a lower grade. **I do take attendance in the class**. Students missing class missing class are responsible for obtaining notes from others in the class. More than four unexplained absences will result in an F for this course.

Students with Disabilities

Differently abled students should approach the instructor or the course coordinator through the Disability Resource Center (DRC) at 703-993-2474.

Where to Get Help

Students encountering difficulties in the course can either approach the instructor or the Counseling Center at (703) 993-2380 http://caps.gmu.edu/psychologicalservices/

Few important resources:

University Catalog: http://catalog.gmu.edu/
University Policies: http://universitypolicy.gmu.edu/
Learning Services: http://caps.gmu.edu/learningservices/
Writing Center: http://writingcenter.gmu.edu/
GMU Libraries: http://library.gmu.edu/
University Career Services: http://careers.gmu.edu/

Course schedule:

Dates	Topic	Skill	Assignments
Aug 25	Introduction, Syllabus, Class Format, Information.	How to approach this course? Information about software	
Aug 27	Introduction to GIS, What is a GIS	Vector, Raster, Visualization,	Read the material emailed by the instructor Open the GIS software and understand the interface.
Sept 1	How to start ArcGIS		Lab

Sept 3	Mapping GIS data, Attribute files	GIS dataset	HW1
Sept 8 and 10	Queries, Reference system The geodatabase for the environmental data	Using public domain environmental data	Lab
Sept 15	Creating and Integrating Data for Natural Resources Application-Basic commands	Applied aspects of Environmental GIS.	HW 2: Gulf of Mexico oil spill analysis
Sept 17 and 22	Habitat Analysis	GIS, Spatial Analysis and Modeling Overview Spatial Representation and Temporal Dynamics in Environmental GIS	HW 3: Habitat location
Sept 24	Google KML	Importing, Exporting, Analysis using from KML data	HW4: impact study of Alaska oil development and climate change
Sept 29	Spatial analysis tool, Surface	Exploring the digital elevation model	Lab
Oct 1	Application of GIS in Solving Environmental Problem	Raster images to monitor quality and quantity	Lab and Literature review due
Oct 6 and 8	Watershed GIS	Introduction to raster images to monitor quality and quantity	Lab
Fall break			
Oct 20	Landuse change, Landuse interpretation	Processing Remote sensing (RS) data/image processing	HW5: Downloading remote sensed data and processing (e.g., land classification)
Oct 22	Application of RS	Examples	RS data practice
Oct 27	Climate Change - The CO2 sequestration	From the biomass to the CO2	Lab: climate modeling using NetCDF data

Oct 29	Solar analyst extension - Exploring the solar energy	Calculating Solar Radiation Using Solar Analyst	HW6: calculating solar energy potential of rooftops of GMU campus
Nov 3	Marine GIS	Working with Marine GIS data	HW7: GPS data and tracking shark for conservation
Nov 5	Mid-term Exam		
Nov 10 and 12	Special topics and guest speakers		
Nov 17 and 19	Course review/students work on their project		
Nov 25	EVPP 505 students present their final project		
Dec 1 and 3	students work on their final project		
Dec 8	Project submission through blackboard		Project submission through blackboard

Assignments:

Homework:

During this semester we will have seven computer exercises that are to be completed inside the structures class time. These exercises are designed to understand the capabilities and techniques used in Environmental GIS. The software and data required for those exercises will be provided during the lessons, and each of them covers the topic of the lecture. You can use the data and the software at home if you already have GIS software installed on your computer. You might work together with classmates on computer exercises if you wish, but the responses submitted must be your own, through a blackboard. All the material and the dataset will be available on the blackboard. You download the dataset, and you answer the questions directly on the section of the blackboard.

Late homework policy:

Homework is due by the start of class on the specified due date. Homework is accepted up to 4 days late. Each day late incurs a 10 point penalty (including weekend days). There are NO exceptions to this policy.

Final GIS Project:

Select an application of GIS technology that you are interested in. Design your project to answer a problem by using GIS analysis. Components of this project should include:

1. a problem statement
2. a description of data used
3. a step-by-step description of the methodology employed, also, list number of GIS tools you used
4. the result in a graphic and/or tabular form
5. your evaluation of the analysis, including how it could be improved
6. references

A brief guideline will be provided during the second class of the course.

Literature review

During the semester (before the fall break) students are required to identify two key research papers, using GMU e-library. The paper should be on the application of GIS to find an environmental solution and are related to the course objectives. Prepare a 500 words write-up on each paper. The write-up should have segments: research question, methodology, finding, and weakness of the paper, and citation.

Mid-term

The mid-term will be an in-class closed-book exam. The in-class exam will have multiple-choice questions. The instructor will explain and will post the guidance on the Blackboard.

Important note: Instructor has right to modify the syllabus, add and change Homework if required.