EVPP 505 002:
Fundamentals of Environmental Geographical Information Science

Spring 2022

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Instructor: Vivek Prasad. PhD
Email: vprasad1@gmu.edu (preferred contact)
Course Meets: Tuesday (F2F), Exploratory Hall L111, and Thursday (virtual) 7:30-8:45 AM
Tutorial: Thursday (virtual) 7:00 PM- 8:00 PM virtual

Thursday meeting will be a mixture of synchronous and asynchronous which instructor will assess based on the progress of the course and will inform the students on Tuesdays. Also, Instructor will be available for tutorial on Thursday, evening, 7PM – 8PM based on the prior email and convenience.

Phone: Please request a meeting via email.
Office hours: Monday: 6:00 PM -7:00 PM (please email me in advance, and we will meet via Virtual via Zoom).

EVPP 430-001 and EVPP 505: 002 co-meet

Tuesday, Jan 25: First day of the class
Mon. Jan 31: Last day to add classes
Monday Feb 7: Last day to drop classes without penalty
Monday, Feb 14: Last day to drop (50% tuition penalty)
Tuesday. Feb 15 – Tuesday, March 1: Unrestricted Withdraw Period (Full Tuition Liability)
Tue. March 2 – Monday, April 11: Selective withdrawal period ((Full Tuition Liability))
(Please refer to the link for more information: https://registrar.gmu.edu/calendars/spring_2022-1/)

Course Description

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.

Blackboard Login Instructions

Access to MyMason and GMU email are required to participate successfully in this course. Please make sure to update your computer and prepare yourself to begin using the online format BEFORE the first day of class. Check the IT Support Center website. Navigate to the Student Support page for help and information about Blackboard. In the menu bar to the left you will find all the tools you need to become familiar with for this course. Take time to learn each. Make sure you run a system check a few days before class. Become familiar with the attributes of Blackboard and online learning.

Required Textbooks

Readings supplied by instructor and posted on the Blackboard Link:

1. The 20 Essential Skills. Gina Clemmer. Second Edition (suggested, 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 8 GB USB for data and lab project storage and retrieval.
4. ArcGIS 10.6 software (evaluation copy from ESRI) and **ArcGIS Pro** will be provided before the semester starts and will be provided instruction to students. You should install it on your computer. **Please note that ESRI software are compatible to Window only.**

Course Learning Outcomes

In this course, students will learn to:

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.

Technology Requirements

Hardware: You will need access to a Windows or Macintosh computer with at least 2 GB of RAM and access to a fast and reliable broadband internet connection (e.g., cable, DSL). A larger screen is recommended for better visibility of course material. You will need speakers or headphones to hear recorded content and a headset with a microphone is recommended for the best experience. For the amount of Hard Disk Space required taking a distance education course, consider and allow for:

1. The storage amount needed to install any additional software and
2. Space to store work that you will do for the course.

If you consider the purchase of a new computer, please go to Patriot Tech to see recommendations.

Software: Many courses use Blackboard as the learning management system. You will need a browser and operating system that are listed compatible or certified with the Blackboard version available on the myMason Portal. See supported browsers and operating systems. Log in to myMason to access your registered courses. Some courses may use other learning management systems. Check the syllabus or contact the instructor for details. Online courses typically use Acrobat Reader, Flash, Java, and Windows Media Player, QuickTime and/or Real Media Player. Your computer should be capable of running current versions of those applications. Also, make sure your computer is protected from viruses by downloading the latest version of Symantec Endpoint Protection/Anti-Virus software for free here.

Students owning Macs or Linux should be aware that some courses may use software that only runs on Windows. You can set up a Mac computer with Boot Camp or virtualization software so Windows will also run on it. Watch this video about using Windows on a Mac. Computers running Linux can also be configured with virtualization software or configured to dual boot with Windows.

Note: If you are using an employer-provided computer or corporate office for class attendance, please verify with your systems administrators that you will be able to install the necessary applications and that system or corporate firewalls do not block access to any sites or media types.

Course-specific Hardware/Software

Check the syllabus for your course or contact the instructor prior to the start of the course to find out about specific technical requirements for your class. Hardware or software required for your course or program may be available for purchase at Patriot Computers (the University's computer store that offers educational discounts and special deals).

ArcGIS10.6 software (evaluation copy from ESRI) will be provided before the course starts and students will install on their computer.

Course Schedule

Dates	Topic	Skill	Assignments
Jan 25	Introduction, Syllabus, Class Format, Information.	How to approach this course? Information about software	
Jan 27	Introduction to GIS. What is a GIS?	Vector, Raster, Visualization,	Read the material Posted on the Blackboard by the instructor Open the GIS software and understand the interface.
Feb 1	How to start ArcGIS		Lab
Feb 8	Mapping GIS data, Attribute files	GIS dataset	HW1
Feb 10	Queries, Reference system The geodatabase for the environmental data	Using public domain environmental data	Lab

Feb 15	Creating and Integrating Data for Natural Resources Application-Basic commands	Applied aspects of Environmental GIS.	HW 2: Gulf of Mexico oil spill analysis
Feb 17 and Feb 22	Habitat Analysis	GIS, Spatial Analysis and Modeling Overview Spatial Representation and Temporal Dynamics in Environmental GIS	HW 3: Habitat location
Feb 24 and March 1	Google KML	Importing, Exporting, Analysis using from KML data	HW4: impact study of Alaska oil development and climate change
March 3	Spatial analysis tool, Surface	Exploring the digital elevation model	Lab
March 8	Application of GIS in Solving Environmental Problem	Raster images to monitor quality and quantity	Lab and Literature review due
March 10	Watershed GIS	Introduction to raster images to monitor quality and quantity	Lab
March 22	Landuse change, Landuse interpretation	Processing Remote sensing (RS) data/image processing	HW5: Downloading remote sensed data and processing (e.g., land classification)

March 24	Application of RS	Examples	RS data practice
March 29	Climate Change - The CO2 sequestration	From the biomass to the CO2	Lab: climate modeling using NetCDF data
March 31	Solar analyst extension - Exploring the solar energy	Calculating Solar Radiation Using Solar Analyst	HW 6: calculating solar energy potential of rooftops of GMU campus
April 5 and 7	Marine GIS	Working with Marine GIS data	HW7: GPS data and tracking shark for conservation
April 12	Mid-term Exam		
April 14 and 19	Special topics and guest speakers		HW 8
April 21 and 26 April 28 and May 3	Course review/students work on their project		Graduate Students will have HW 9 and 10
May 5	Project submission through blackboard		Project submission through blackboard

Assignments Description

	Assignments for 505	**Grade**
1	Literature review (# 4)	10
2	Home work (# 10),	55
3	Mid-term exam	15
4	(additional tools to be used on in	20

	the final projects)	

Homework:

During this semester we will have eight (and 10 for EVPP 505) 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 points 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. Graduate students will add extra tools and complexity to the final project.

Literature review

During the semester students are required to identify two key research papers, using GMU e-library or other sources. 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 (for EVPP 430: 2*500 words=1000 words), (for EVPP 505: 4*500 words=2000 words). 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 online closed-book exam. The online exam will have multiple-choice questions. The instructor will explain and will post the guidance on the Blackboard.

Course Policies

Late Assignments: All assignments must be turned in on the due date given on the assignment sheet.

Instructor-Student Communication: I will respond to your emails within 48 hours. If I will be away from email for more than one day, I will post an announcement in the Blackboard course folder. Before sending an email, please check the following (available on your Blackboard course menu) unless the email is of a personal nature:

1. Syllabus
2. Ask Professor

Feel free to respond to other students in the Ask Professor forum if you know the answer.

Technology. You will need a reliable computer and internet access to view course materials in Blackboard. You will need to video record your two role-plays and you can do that with a smartphone or other video camera, such as Kaltura CaptureSpace in Blackboard.

Grading Scale

F	<63
D	64
C-	70

C	73
C+	77
B-	80
B	83
B+	87
A-	90
A	93
A+	94+

University Policies and Resources

a. Academic Honesty: You are expected to be familiar with and abide by the University's Honor Code. The Code can be found here. It is your responsibility to see me if you have questions about these policies. George Mason University has an honor code that states the following:
   To promote a stronger sense of mutual responsibility, respect, trust, and fairness among all members of the George Mason University community and with the desire for greater academic and personal achievement, we, the student members of the University Community have set forth this:
b. Students must follow the university policy for Responsible Use of Computing
c. Student services: The University provides range of services to help you succeed academically and you should make use of these if you think they could benefit you. I also invite you to speak to me (the earlier the better).
d. Students are responsible for the content of university communications sent to their George Mason University email account and are required to activate their account and check it regularly. All communication from the university, college, school, and program will be sent to students solely through their Mason email account.
e. The George Mason University Counseling and Psychological Services (CAPS) staff consists of professional counseling and clinical psychologists, social workers, and counselors who offer a wide range of services (e.g., individual and group counseling, workshops and outreach

programs) to enhance students' personal experience and academic performance. Counseling Center: Student Union I, Room 364, 703-993-2380.

f. Students with disabilities who seek accommodations in a course must be registered with the George Mason University Office of Disability Services (ODS) and inform their instructor, in writing, at the beginning of the semester. All academic accommodations must be arranged through that office. Please note that accommodations MUST BE MADE BEFORE assignments or exams are due. I cannot adjust your grade after the fact.

g. Students must follow the university policy stating that all sound emitting devices shall be turned off during class unless otherwise authorized by the instructor.

h. The George Mason University Writing Center staff provides a variety of resources and services (e.g., tutoring, workshops, writing guides, handbooks) intended to support students as they work to construct and share knowledge through writing. University Writing Center: Robinson Hall Room A114, 703-993-1200. The writing center includes assistance for students for whom English is a second language.

i. Diversity: George Mason University promotes a living and learning environment for outstanding growth and productivity among its students, faculty and staff. Through its curriculum, programs, policies, procedures, services and resources, Mason strives to maintain a quality environment for work, study and personal growth.