ENVIRON 759K

Environmental GIS

Fall 2018

Dates / course meeting time: 150 minutes of contact hours per week for 14 weeks
Academic credit: **3 credits**
Course format: Lecture & Lab Session

Instructor's Information

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What is this course about?

Geographic Information Systems (GIS) is a computer-based tool that uses spatial data to analyze and solve problems. This course introduces students to the core concepts and latest application of geographic information system in environment area. It will give an in-depth overview of the key data types (raster and vector files) in this area, data collection and entry, data management, data analysis and output using ArcGIS. This course will also introduce application of GIS in real world problem solving, such as species habitat mapping and conservation planning. Students will be exposed to Google Earth, QGIS and other open source GIS tools.

What background knowledge do I need before taking this course?

This is an iMEP elective course. There are no prerequisites.

What will I learn in this course?

At the end of the course, students should be able to

- Describe and define main concepts and processes in geographic information system
- Master the basic skills to apply geospatial analysis tools to solve environmental problems
- Demonstrate proficiency in using ArcGIS for basic GIS analysis
- Design a GIS-based research related to environmental issues and produce appropriate visual outputs

How will I know if I have met the objectives of this course?

The course will be constituted of three parts: lectures, lab sessions and one final project. The instructor will provide key concepts in each lecture. Students are required to finish readings and prepare for lab session. For each lab session, the instructor will guide the students through the lab work to master the basic tools and concepts related to the previous lecture. After the lab session, students need to finish the assignment on their own to demonstrate the understanding of the key process and practice related techniques. For the final project, students will work on an individual project which relates to a real world problem. Students will identify their own topic and data source with the assistance of the instructor. The final project includes a database that shows the data source and final output, a written report and a presentation.

How can I prepare for the class sessions to be successful?

The lecture is designed to provide an overview of the key concepts and techniques. Students should finish the required readings before the lecture and participate in the discussion during the class.

Students are expected to have well prepared lab session (go over the lecture and reading materials before the lab) and active participation in class. Questions are encouraged during the lab session and students should be able to work on the assignment on their own after the lab session. For each week, students need to submit a write up report for the lab and assignment before the deadline.

The final project is consisted of a geospatial analysis, a presentation and a written paper. The final presentation should follow the academic presentation format with a clear outline and references. The students are encouraged to use graphs, tables, illustration and photos for better communication during the presentation. Answers to questions and discussions after the presentation are also evaluated.

What required texts, materials, and equipment will I need?

GIS Fundamentals. A First Text on Geographic Information Systems. Fifth Edition. Paul Bolstad. Copyright 2016

ArcGIS is installed in the computer lab and students are encouraged to download the software on their personal laptop as well.

How will my grade be determined?

Lab session and assignment:	50%
Final project, paper and presentation:	30%
Attendance and participation in discussion:	20%

What are the course policies?

[DKU Administrators: insert link to a pdf or website url for the full DKU course policies and guidelines.]

1. Academic Integrity:
   Each student is bound by the academic honesty standard of the Duke Kunshan University. Its Community Standard states: "Duke Kunshan University is a community composed of individuals of diverse cultures and backgrounds. We are dedicated to scholarship, leadership, and service and to the principles of honesty, fairness, respect, and accountability. Members of this community commit to reflect upon and uphold these principles in all academic and non-academic endeavors, and to protect and promote a culture of integrity."

2. Laptop Use Policy
   You can use laptop for lectures to write note. However, browsing irrelevant contents or websites is not allowed.

3. Attendance
   Students are required to attend the class and actively participate in the discussion and presentation. In the rare event of an illness or true emergency that prevents a student from accomplishing one of the reports, exercises or presentations, the student must contact the instructor by e-mail immediately to discuss possible alternate arrangements. If you have a legitimate scheduling conflict, you must contact the instructor ahead of time to make alternate arrangements.

4. Attention to assignment deadlines
   The assignment is due 5pm on the due day. Late submission will have penalty of 5% off for each late hour.

What campus resources can help me during this course?

[DKU administrators: Insert link to a pdf or website url for the full list of resources, that includes the writing center, language labs, tutors, and any other relevant campus learning resources.]
In this section, highlight particularly relevant resources or other resources that are discipline specific that are useful for students, in addition to the general resources outlined in the link above.

What is the expected course schedule?

WEEK	Lecture and Reading	Lab
Week 1	Overview, introduction to geospatial analysis, data types *Bolstad ch1*	Lab orientation and introduction to ArcGIS (ArcMap, ArcCatalog and Online Resources)
Week 2	Map projection, coordinate system and map elements *Bolstad ch3-4*	Display, data entry, symbology, extent, metadata and project layers
Week 3	Vector data *Bolstad ch2*	Digitizing maps, vector data creation and basic analysis
Week 4	Vector analysis Bolstad ch8-9	Distance, area, angle calculation, buffer, merge, dissolve tools
Week 5	Raster data *Bolstad ch11*	DEM and terrain modelling
Week 6	Raster analysis *Bolstad ch10, 13*	Classification and raster calculator
Week 7	3D model and Google earth	Introduction to ArcScence and google earth
Week 8	Species Distribution Model	Use GLM, Maxent with ArcGIS
Week 9	Conservation Planning	Use Marxan with ArcGIS for priority setting
Week 10	Habitat fragmentation Analysis	Use Fragstat with ArcGIS
Week 11	Accuracy Assessment *Bolstad ch6*	GIS models and python script
Week 12	Cost path analysis	Corridor analysis

Week 13	Spatial Interpolation and Geostatistics *Bolstad ch12*	Individual project
Week 14	Individual presentation	Individual presentation