**GEOG 4760 (#3389/#3396) / GEOG 5760 (#3385/#3386)**

**Geographic Information Analysis**

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**Spring Semester 2015-16**

**Lecture:** M/W/F @ 10:45 am – 11:40 am  
**Lab:** M @ 11:50 am – 1:40 pm

**Instructor:** **Dr. Gaurav Sinha**  
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Email: sinhag@ohio.edu  
Phone: 740.593.0304  
Web: http://ohio.edu/people/sinhag  
Office Hours: T/Th @ 1 - 2pm  
Office Hours: W/F @ 12:00 – 2:00 pm (*and by appointment*)

**Teaching Assistant:** Logan Woloch  
Office: Clippinger, 102  
Email: lw594014@ohio.edu  
Office Hours: T/Th @ 1 - 2pm  
Office Hours: W/F @ 12:00 – 2:00 pm (*and by appointment*).

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**Course Content**

This course is designed to foster advanced spatial analysis skills in students. The course assumes that students have a basic understanding of statistics and GIS. In this advanced course, the goal will be understand the special mathematical techniques devised for analyzing different kinds of geographic data. The role of uncertainty in spatial decision making will be a constant theme in all discussions and lab exercises. Special topics such as terrain and hydrologic analysis, spatial multicriteria decision making, network analysis, and spatial statistics and interpolation will be used to teach advanced spatial analytical skills with GIS software. In digital terrain analysis, students will use ArcGIS and GRASS software to derive quantitative geomorphometric parameters, identify topological primitives for describing terrain shape, and implement drainage network and watershed segmentation algorithms. In multi-criteria analysis students will get introduced to some traditional spatial decision making frameworks. Hydrological and transportation network analysis will expose students to the benefits of topological data modeling and how linear networks may be modeled and analyzed. Finally, a basic introduction to spatial statistics and spatial interpolation will prepare students with a variety of exploratory spatial statistical methods for detecting and quantifying spatial patterns. Spatial interpolation techniques such as Voronoi tessellation, inverse distance weighing, and spline techniques will be discussed and compared to each other. Global and local spatial autocorrelation statistics, nearest neighbor statistics, and point pattern analysis will also be introduced at the end of the class. All these concepts and projects will strengthen independent quantitative analysis capabilities and give students practical experience with a variety of analytical software tools such as Microsoft Access, Excel, ArcGIS, Landserf, QGIS, and GRASS.
Learning Objectives
The course lectures and lab exercises will collectively help students understand
- the theoretical principles based on which geographic information can be analyzed
- how to apply conventional GIS tools and software to geographic information analysis
- the fundamentals of raster based GIS analysis and modeling
- how to develop GIS based workflows
- principles of terrain analysis
- basics of spatial multicriteria analysis
- how to structure and analyze transportation networks
- spatial statistics and its application to basic geographic information analysis

Pre-Requisite Courses
GEOG 4730/5730 – Principles of GIS OR
GEOG 4660/5660 – Principles of Remote Sensing OR
GEOG 3600/5600 – Cartography I

Instruction Material
There is no prescribed text book for the class. Lecture and lab material will be based on several
text books, articles, journal publications, and the instructor’s research and professional
background in application and development of GIS principles and software. The lecture slides
will be provided for reference. Class lectures and lab exercise material will be the basis for lab
exercises and exams. Students may be working in groups whenever possible. Attending classes
together is, therefore, highly encouraged.

Grading (4 credits)
The lectures and lab exercises will be considered together for grading purposes. All lecture,
class discussions, assigned readings, student presentations, lab exercises, and relevant book
chapters will define the scope of quizzes and exams. The final exam will be given at least a
week before the due date on the official final exam date for this class. Students will be expected
to show motivation and write reports for each lab to summarize lessons learned. The following
is the grading strategy and schedule that will be used to determine the final grade for each
student:

Final Exam Due (Mon, Apr 25) 25%
Lab Projects/Reports 75%

Grading Schedule

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Class Participation & Attendance
Attendance and participation in class discussions will be expected and strongly encouraged. Since the course relies heavily on in-class demonstrations and project work, punctuality and attendance is critical. If any topic is unclear after lecture, please do not hesitate to see me as soon as possible. You will be held responsible for all material covered in class and deductions may be imposed for projects turned in late. If you do miss class, you should make every effort to contact me before the next class so you can catch up on missed material. No extra credit is available and all projects and final exam must be completed. Students may work in groups; hence it is also critical to work closely and coordinate work schedule with the group partner(s).

Academic Integrity
Students are expected to abide by the Ohio University Student Code of Conduct. Depending on the nature of the violation, the instructor’s response may range from imposing grade penalty to assigning an automatic failure grade. Students will be reported to the respective advisor and appropriate school authorities in case of academic misconduct and/or misdemeanor in class.

Other Instructions
The course will utilize Blackboard only partially for some postings. All lecture and lab material will be made available only on the local network drive allocated for the class. Please check your O.U. email regularly as that will be the preferred system of communication. Also note that this course, especially the lab exercises, are extremely time intensive. Please allocate sufficient time to work on labs beyond the officially allocated hours.

Institutional Equality
In compliance with the Americans with Disabilities Act (ADA), all students who have a document disability are entitled to “reasonable academic accommodations.” If you are a student with special needs, it is your responsibility to be registered with the Institutional Equity representative at Student Services. In addition, you need to inform your instructor each quarter before the end of the second week of class.