

## Course description

LA 567 emphasizes application of GIS modeling techniques to landscape planning and ecological and cultural management issues. You may select landscape modeling applications for your studio projects, outreach projects, or research projects.

Modeling applications include use of descriptive and predictive GIS modeling tools and techniques, including map algebra, Boolean logic, environmental diversity indices, logit modeling, logistic regression, spatial analysis, spatial statistics, and geo-statistics. You can view additional information about the course on our course Web page:

*<http://www.public.iastate.edu/~fridolph/la567.html>*

ArcGIS 9.3 and Spatial Analyst extension are the primary modeling software tools. We also use ModelBuilder functions. Because ArcGIS cannot fulfill all modeling needs, plan on using other analysis software along with ArcGIS. Examples of other useful analysis software include ArcView 3.3, Excel, Geoda, Fragstats, downloaded extensions, and statistical packages (JMP, SAS, SPSS).

LA 567 is part of the curriculum for the ISU GIS Certificate. LA 567 applies to the requirement for 6 credits of GIS Tools and Techniques. You can view information about the ISU GIS certificate program at

*<http://www.design.iastate.edu/CRP/gisprogram.php>*

**Prerequisites:** Because ArcGIS 9.3 and its extensions are the primary modeling tools, we expect you to come to this course with a working knowledge of ArcGIS, ArcView, or Arc/Info. More specifically, we expect you to be able to

- Acquire existing data for a project database by downloading via FTP or Web
- Use metadata to evaluate the applicability and limitations of GIS data
- Add to a project and use software extensions (such as Spatial Analyst)
- Display feature themes (point, polyline, polygon) alone and in combination
- Add an image theme (air photo or map) as an underlay (background image)
- Select features for display using query tools
- Save a subset of features as a new feature theme
- Convert feature themes to raster grid themes
- Digitize or edit data for feature themes
- Work with attribute tables (edit data values, add fields, join tables, field statistics)
- Create a finished product (layout) with title, map, legend, scale, north arrow, labels
- Organize and manage files (create folders, copy files, backup, archive, WinZIP)

We do not expect you to already have modeling experience. It's more important that you come with an interest and a need to do GIS modeling of landscape patterns and cultural and natural resources. In this course, you'll have a chance to add to the skills listed above. For example, by the end of the course, we expect you to be able to

- Use functions and features of the Spatial Analyst extension
- Apply ModelBuilder to site suitability studies
- Clip and merge (mosaic) grid themes
- Change projection and datum for a feature theme
- Create a grid theme surface using interpolation functions
- Derive slope steepness, aspect, hillshade, and visibility themes from DEMs

## Learning outcomes

After completing LA 567, you should be able to do the following:

- Describe examples of GIS descriptive modeling and predictive modeling applications
- Select appropriate GIS modeling procedures for projects in your area of interest
- Use appropriate landscape modeling functions: numerical, logical, and geographic
- Apply GIS technology to landscape suitability modeling
- Apply spatial analysis and modeling tools in ArcMap and ArcView, Spatial Analyst, ModelBuilder, and other extensions that relate to your area of interest
- Apply GIS modeling procedures to a project you're working on (1) in another class, (2) in your thesis research, or (3) in an outreach project

## Course requirements

To successfully complete this course, you must do the following:

- Complete the required peer teaching assignment
- Select and complete your portion of a team project
- Write a report of your team project results and present it to class members
- Select and complete an individual project related to another class or your research
- Present the results of your individual project to class members and guests
- Write a detailed report of your individual project. You must
  - A. Use thesis format
  - B. Use precise language and use correct grammar, spelling, and usage
  - C. Include an abstract
  - D. Include spatial questions (hypotheses are optional)
  - E. Describe the project purpose, background, context, and why you selected this project
  - F. Include definitions of key terms and concepts
  - G. Include literature citations, especially studies that are helpful models/precedents for your project
  - H. Include one or more maps to show study area location and context
  - I. Describe your study area using GIS maps that show landscape patterns and characteristics
  - J. Diagram the major steps and sequence you used to complete your GIS study
  - K. Describe in detail your methods, procedures, and tools
  - L. Describe your database and data sources, including metadata
  - M. Describe and illustrate your project results
  - N. Review your results in relation to each of your spatial questions/hypotheses
  - O. Include thoughtful conclusions about the meaning and implications of your results
  - P. Include recommendations for future study and research
  - Q. Include a complete bibliography in standard bibliographic format
  - R. Include appropriate appendices

# Course schedule

## **Part 1** (4 weeks) **20%** of course grade

Course overview and organization. Review of ArcMap, ArcView, Spatial Analyst, and ModelBuilder modeling tools. Hands-on individual tutorials. Peer teaching assignment.

- Monday, 8/24 Course introduction, practice map, select peer teaching topic, meet with instructors
- Wednesday, 8/26 Meet with instructors
- Friday, 8/28 Prepare peer teaching presentations and exercises
- Monday, 8/31 Prepare peer teaching presentations and exercises
- Wednesday, 9/2 Metadata and documentation
- Friday, 9/4 Prepare peer teaching presentations and exercises
- Monday, 9/7 No class (ISU holiday)
- Wednesday, 9/9 Peer teaching presentations and exercises
- Friday, 9/11 Peer teaching presentations and exercises
- Monday, 9/14 Peer teaching presentations and exercises
- Wednesday, 9/16 Peer teaching presentations and exercises
- Friday, 9/18 Peer teaching presentations and exercises

## **Part 2** (3 weeks) **30%** of course grade

Descriptive and predictive GIS modeling for landscape planning and management. Class project in teams. Site selection and landscape suitability modeling for a proposed use. ESRI ModelBuilder and Spatial Analyst extension. Spatial analysis of point patterns, networks, structural patterns, surfaces, and grids. Written report and class presentations.

## **Part 3** (8 weeks) **50%** of course grade

Application of modeling tools and procedures to a studio project, outreach project, or research project. Individual project selected by each student. Written report and class presentations.

# Course bibliography

There is no required textbook for this course. However, expect to purchase at least one book, manual, or reference work that helps you complete your team project or individual project.

Required reading will be in the form of handouts or reserve materials on the Web or in the Design Reading Room. Other references will be used on an as-needed basis. Many of these are listed on our course Web page:

<http://www.public.iastate.edu/~fridolph/la567.html>

# Course instructors

Paul Anderson  
481 College of Design  
294-8943  
fridolph@iastate.edu  
[www.public.iastate.edu/~fridolph/](http://www.public.iastate.edu/~fridolph/)

Jasna Hadzic  
562 College of Design  
294-8984  
jhadzic@iastate.edu

# Course policies

- 1. Attendance.** We expect you to attend every class. If you can't, please Email or call us to let us know why you're not able to come. Your final course grade includes not only the quality of your work, but attendance, attitude, and improvement. These are things that potential employers ask about when they call for a job reference.
- 2. Course grades.** Your final course grade will include the grade from each of our three projects. The percentage of the final course grade assigned to each project is listed below. For each project, the major grading criteria and the percentage assigned to each is listed on the project statement. We prepared a rubric for some of our projects. Use the rubric as a checklist as you develop your project and prepare to hand in your project.

• Project 1	Peer Teaching Presentation Exercise	20 percent of course
• Project 2	GIS Landscape Suitability Modeling (team)	30 percent of course
• Project 3	GIS Landscape Modeling (individual)	50 percent of course

We'll use numerical scores to grade your projects and compute grade averages. Letter grade equivalents are listed below:

94 ≤ A	74 ≤ C < 77
90 ≤ A- < 94	70 ≤ C- < 74
87 ≤ B+ < 90	67 ≤ D+ < 70
84 ≤ B < 87	64 ≤ D < 67
80 ≤ B- < 84	60 ≤ D- < 64
77 ≤ C+ < 80	F < 60

Here are our expectations for each letter grade:

- A excellent work; exemplary; greatly exceeds satisfactory standards; self-starter; routinely shows initiative; often does outside research; generates thoughtful and innovative solutions; carries work to a high level of finish, going well beyond requirements and assigned elements
  - B very good work; exceeds satisfactory standards; consistent progress in class; routinely shows initiative; occasionally does outside research; generates workable solutions; carries all work to completion, going beyond requirements and assigned elements
  - C acceptable work; meets satisfactory standards; occasionally shows initiative; does little outside research; completes work with routine solutions; little evidence of taking initiative or going beyond minimum requirements and assigned elements
  - D marginal work; somewhat below satisfactory standards; doesn't complete all work; shows little initiative; doesn't do outside research; generates ineffective or problematic solutions; lacks consistency in meeting minimum requirements and including assigned elements
  - F unacceptable work; serious deficiencies in meeting satisfactory standards; shows no initiative; doesn't do outside research; generates inappropriate solutions; shows little or no care in finished work, consistently below minimum requirements; is missing assigned elements
- 3. Late work.** Late work involving presentations will not be accepted. Late work for written projects will be accepted; however, the maximum possible points will be lowered according to the following schedule:

same day	-10% (of maximum possible points)
1 day	-20%
2-3 days	-30%
4-7 days	-40%
8-14 days	-50%
15-45 days	-60%
46-70 days	-70%
71-120 days	-80%

4. **Course materials.** We anticipate that you'll need to buy some CD blanks, USB drives, Zip disks, or other special storage media. You may also need to purchase special software or manuals, depending on your modeling needs and interests.
  
5. **Other policies.** We expect you to follow the policies of the LA department, Design College, Durham Center, Academic Information Technologies, ISU GIS Facility, and the university. These include, but are not limited to, policies about computer use, academic honesty, field trips, studio culture, sexual harassment, health, safety, and security. Please address any special needs or accommodations with us at the beginning of the semester. Those seeking accommodations based on disabilities should obtain a Student Academic Accommodation Request (SAAR) form from the Disability Resources office (515-294-6624, 1076 Student Services Building).
  
6. **Course handouts.** We'll have relatively few handouts for this course. Most of our course handouts will be posted on our course Web page in Acrobat PDF format. You can read and print them using Acrobat Reader. Other course materials, references, and links will also be posted on our course Web page:  
*<http://www.public.iastate.edu/~fridolph/la567.html>*