1. **Course Objectives**

   This course focuses on the uses of GIS techniques in solving practical environmental problems. The student objectives of this class are:

   - Learning ideas of how GIS can be applied to various fields of environmental studies and applications through examining real examples concerning soils, watershed hydrology, vegetation, landuse/land cover, climate, pollutions, landscape ecology, and natural hazards.
   - Learning fundamental knowledge and techniques required in application projects for solving environmental problems, including the methodology of starting and running such projects, and spatial analytical techniques that are frequently used in such projects.
   - Developing individual experience in the use of GIS in solving environmental problems through execution of a term project, and presenting it both orally and in written form.

The course is made of three components: the lectures, the lab exercises, and the term project. In the lectures, specific application examples are examined. The ideas, procedures, and the techniques in these examples are analyzed, explained, and discussed. In the lab part, the students gain hands-on experience on those spatial analytical techniques that are frequently used in the environmental
applications of GIS. The students complete term projects to obtain experiences in solving real-world environmental problems with GIS. The topics of the term projects and the software tools used for the projects are chosen by the students themselves, but should be approved by the instructor.

2. **Prerequisites**
   Geography 58 “Introduction to GIS”.

3. **Computing Environment and Software**
   ArcGIS will be used in the lab part of this class. ArcGIS runs under Microsoft Windows environment on IBM compatible PCs.

4. **Grading**
   There are six exercises, one exam and one term project in this course.

<table>
<thead>
<tr>
<th>Component</th>
<th>Weight</th>
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<tbody>
<tr>
<td>Lab Exercises</td>
<td>30%</td>
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<tr>
<td>Class presentation</td>
<td>15%</td>
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<tr>
<td>Term Project</td>
<td>35%</td>
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<tr>
<td>Exam</td>
<td>20%</td>
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5. **Course Materials**
   - **Text**

   - **References**


6. Intended Schedule

Week 1:
Lecture 1. Introduction to Geog 59 (March 26)

Lecture 2. Idea examples for term projects (March 28)

Week 2:
Lecture 3. Introduction to natural resource survey and environmental assessment (March 31)

Lecture 4. Introduction to environmental modeling and planning (April 2)

Lecture 5. Methodology of starting and running a GIS application project (April 4)

Lab 1. Downloading USGS DEM and creating a 3D color terrain map of Hanover

Week 3:
Lecture 6. Examples of using GIS to assist watershed management (I): landform and hydrograph (April 7)

Lecture 7. Terrain analysis (I): extracting primary landform information from DEM (April 9)

Lecture 8. Terrain analysis (II): extracting hydrographic information from DEM (April 11)

Lab 2. Terrain analysis with DEM

Lab 1 due.

Week 4:
Lecture 9. Examples of using GIS to assist watershed management (II): soil (April 14)

Lecture 10. Knowledge-based soil mapping (April 16)

Lecture 11. Fuzzy logic in soil mapping (April 18)

Lab 2. Terrain analysis with DEM (cont.)

Week 5
Lecture 12. Examples of using GIS in global change study (I): climate (April 21)

Lecture 13. Geostatistic analysis of climate data (I) (April 23)

Exercise 3. Geostatistic analysis

Exercise 2 due.

Week 6:
Lecture 15. Midterm exam (65 min) (April 28)

Lecture 15. Examples of using GIS in global change study (II): vegetation (April 30)

Lecture 16. Supervised and unsupervised classification of vegetation (May 2)

Exercise 3. Geostatistic analysis (cont.)

Week 7:
Lecture 18. Examples of using GIS to monitor and model pollutions (I): air, water, and groundwater (May 5)

Lecture 19. Modeling pollution in air (May 7)

Lecture 20. Modeling pollution in water and groundwater (May 9)

Exercise 3 due.

Week 8:
Lecture 21. Examples of using GIS in environmental health study (May 12)

Lecture 22. Spatial correlation analysis (I) (May 14)

Lecture 23. Spatial correlation analysis (II) (May 16)

Week 9:
Lecture 24. Term project presentations (May 19)

Lecture 25. Term project presentations (May 21)

Lecture 26. Term project presentations (May 23)
Week 10:

Lecture 27. Course summary (May 28)

Term project report due.