Course Objectives & Outcomes
College of Science & Engineering

Department: Geosciences
Course Number: GEOL 5504
Course Name: Advanced GIS

Objective 1) To comprehend and apply spatial modeling using workflow systems in GIS
Outcomes:
1. Students can build conceptual workflows and spatial models of common GIS problems including optimal siting.
2. Students can implement workflows and spatial models within the ArcGIS ModelBuilder environment.
3. Students can use these workflows and models to solve common GIS problems and to build maps showing results.

Assignments that demonstrate accomplishment of this outcome:
1. Correct solution of eight laboratory exercises involving the application of workflows and spatial modeling to common geosciences and business GIS problems. Laboratory solutions include a several page lab summary describing the solution in detail and showing final maps.
2. Successful completion of a quiz hand drawing a spatial model of a siting problem.
3. Satisfactory completion of exam questions (both computer based and concept based) related to spatial modeling.
4. Final project and report should include a model construction using the ArcGIS ModelBuilder software.

Objective 2) To comprehend and apply general raster analysis and map algebra
Outcomes
1. Students understand map algebra and can solve spatial problems using map algebra.
2. Students understand data sampling and interpolation techniques and can use these techniques to solve spatial problems.
3. Students understand other common raster based spatial analysis techniques and tools including density analysis, resampling, reprojection, and image registration.

Assignments that demonstrate accomplishment of this outcome:
1. Correct solution of laboratory exercises that include the principles of raster analysis and map algebra.
2. Successful completion of one or more quizzes on the concepts of spatial analysis and map algebra derived from the reading assignments.
3. Satisfactory completion of exam questions (both computer based and concept based) related to the concepts and application of raster analysis and map algebra.
4. Final project and report should include demonstration of the use of raster analysis and map algebra as appropriate to the final project problem.

Objective 3) To comprehend and apply terrain analysis techniques in GIS.
Outcomes
1. Students understand and can compute common terrain analysis concepts and techniques including slope, aspect, curvature, line of site, and least cost path.
2. Students understand and can compute common hydrologic terrain analysis concepts and techniques including hydrologic slope, flow direction, pit removal, flow accumulation, stream network extraction, and watershed boundary delineation.

Assignments that demonstrate accomplishment of this outcome:
1. Correct solution of laboratory exercises on the principles of hydrologic terrain analysis.
2. Successful completion of one or more quizzes on the concepts of hydrologic terrain analysis derived from the reading assignments.
3. Satisfactory completion of exam questions (both computer based and concept based) related to the concepts and application of hydrologic terrain analysis.
4. Final project and report should include some usage of terrain analysis techniques.