COURSE OUTLINE

CONS 350 – INTRODUCTION TO GEOGRAPHIC INFORMATION SYSTEMS

Prepared By: Robert R. Blickwedehl
A. **TITLE:** Introduction to Geographic Information Systems

B. **COURSE NUMBER:** CONS 350

C. **CREDIT HOURS:** 3

D. **WRITING INTENSIVE COURSE:** No

E. **COURSE LENGTH:** 15 weeks

F. **SEMESTER(S) OFFERED:** Spring

G. **HOURS OF LECTURE, LABORATORY, RECITATION, TUTORIAL, ACTIVITY:**
   2 lecture hours and 3 laboratory hours per week

H. **CATALOG DESCRIPTION:** The course introduces students to GIS terminology, the concept of relational databases, spatial data models, topology, raster data and vector data. Data entry methods, including quality control and metadata are discussed. The student is introduced to spatial analysis applications including terrain analysis, cartographic modeling and visualization. Students apply knowledge in the laboratory using GIS software.

I. **PRE-REQUISITES:** CITA 109, junior status, or permission of the instructor.

J. **GOALS (STUDENT LEARNING OUTCOMES):**
   By the end of this course, the student will be able to:

<table>
<thead>
<tr>
<th>Course Objective</th>
<th>Institutional SLO</th>
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<tbody>
<tr>
<td>a. Define terminology applicable to Geographic Information Systems</td>
<td>1. Communication</td>
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<td></td>
<td>3. Prof. Competence</td>
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<td>b. Compile and organize spatial and attribute data to create a map that communicates information.</td>
<td>1. Communication</td>
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<td>3. Prof. Competence</td>
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<td>c. Comprehend the importance of map projections, datums and coordinate systems and apply corrections to synthesize data from different sources.</td>
<td>2. Crit. Thinking</td>
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<td>3. Prof. Competence</td>
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<td>d. Create a map by synthesizing and georeferencing data from old drawings.</td>
<td>2. Crit. Thinking</td>
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<td>3. Prof. Competence</td>
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<td>e. Evaluate spatial and attribute data to determine trends and impacts.</td>
<td>2. Crit. Thinking</td>
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<td>3. Prof. Competence</td>
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<td>f. Create a map from GPS, remotely sensed or independently processed data.</td>
<td>1. Communication</td>
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<td>3. Prof. Competence</td>
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K. **TEXTS:**

L. **REFERENCES:**

M. **EQUIPMENT:** Computer labs with ArcGIS software.
N. **GRADING METHOD:** A-F

O. **MEASUREMENT CRITERIA/METHODS:**

- Exams
- Quizzes
- Laboratory Projects
- Final Project

P. **DETAILED COURSE OUTLINE:**

I. Introduction to GIS
   A. Components of a GIS
   B. GIS software
   C. GIS applications

II. Data Models
   A. Data modeling concepts
   B. Vector data models
   C. Raster data models

III. Geodesy
   A. Shape of the earth
   B. Units of measurement
   C. Map projections
   D. Coordinate systems

IV. Map creation
   A. Creating a database
   B. Digitizing
   C. Coordinate transformation
   D. Map outputs
   E. Metadata

V. Global navigation satellite system
   A. GPS basics
   B. Differential correction
   C. GPS applications

VI. Aerial and satellite imagery
   A. Basic principles
   B. Air photo interpretation
   C. Satellite imagery
      i. Sources
      ii. Interpretation

VII. Digital Data
    A. Sources
    B. Uses

VIII. Attribute data and tables
    A. Relational databases
    B. Joining tables
    C. Normal forms

IX. Spatial analysis
    A. Boolean algebra
    B. Classification
C. Dissolving
D. Proximity functions and buffers
E. Overlaying
F. Clipping
G. Network analysis

X. Raster analysis
A. Map algebra
B. Local functions
C. Neighborhood functions
   i. Zonal functions
   ii. Cost surfaces

XI. Terrain analysis
A. Slope and aspect
B. Hydrologic functions
C. Viewsheds
D. Profile and contour plots
E. Shaded relief maps

XII. Spatial models and modeling
A. Cartographic models
B. Weighting and ranking
C. Spatio-temporal models
D. Examples

Q. **LABORATORY OUTLINE:**

I. Introduction to ArcGIS
II. Reprojecting map layers
III. Map Design and Layouts
IV. Using imagery to prepare a map
V. Georeferencing old data
VI. Proposal for student project
VII. Using attribute tables
VIII. Spatial analysis
IX. Terrain analysis
X. Cartographic Modeling
XI. Student Project