Program Level Learning Outcome Assessment

MS in GeoInformatics

PLO1: Students will develop a strong conceptual model for a geospatial problem with spatial and systematic thinking. The model serves as a bridge between the complex physical world and a structured geospatial solution in GeoInformatics.

Learning Outcome	Does Not Meet Expectations	Approaches Expectations	Meets Expectations	Masters
Students will be able to decompose a complex geographic phenomenon into discrete spatial entities (vectors) or continuous fields (rasters) based on the underlying physical or social processes.	Fails to identify core spatial entities; confuses discrete objects with continuous fields.	Identifies entities but fails to justify the choice of geometry, such as using points where polygons are required.	Correctly identifies and justifies all spatial entities required for the problem.	Clearly defines entities and anticipates future scalability or secondary data needs.
Students will be able to design a formal topological framework that defines the rules of interaction between disparate spatial datasets to ensure logical consistency.	No evidence of logical connections; data layers are treated as isolated silos. Model would result in significant data "leaks" or geometry errors if implemented.	Defines basic relationships (e.g., "A is near B") but lacks formal topological rules.	Establishes formal topological rules (e.g., "Parcels must not overlap," "Valves must be on Pipes").	Develops a complex, hierarchical schema that accounts for one-to-many and many-to-many relationships.
Students will be able to justify the selection of specific spatial and temporal resolutions, with understanding of the Modifiable Areal Unit Problem (MAUP) and ecological fallacy.	Cannot explain MAUP or ecological fallacy; selects spatial or temporal resolution arbitrarily without any justification; shows no awareness of how scale choices affect analytical results.	Demonstrates basic awareness of MAUP or ecological fallacy but cannot apply the concepts to justify resolution choices; selects resolution based on data availability alone without evaluating analytical trade-offs.	Correctly explains MAUP and ecological fallacy; justifies the selection of spatial and temporal resolutions with reference to the phenomenon being studied and demonstrates awareness of how alternative scale choices could alter results.	Understand and evaluate the sensitivity of results to resolution choice with approaches like multi-scale analysis and sensitivity testing.
Students will be able to conceptualize a unified conceptual framework that synthesizes heterogeneous data sources into a unified conceptual framework.	No attempt to integrate heterogeneous sources; treats each dataset in isolation with no resolution of conflicting semantics or schemas.	Identifies some constraints but misses critical topological errors (e.g., gaps/slivers); partial integration of data sources without resolving semantic conflicts.	Includes a validation plan to ensure the model maintains integrity during data entry; integrates heterogeneous data sources into a coherent framework.	Proposes an automated validation framework (e.g., Geodatabase Topology Rules) to enforce logic; fully achieves interoperability across all data sources, particularly following OGC standards.

Learning Outcome	Does Not Meet Expectations	Approaches Expectations	Meets Expectations	Masters
Students will be able to conceptualize the potential sources of errors and uncertainties in the data acquisitions, transformations, and how they propagate through a geospatial model, affecting the reliability of the final output.	Cannot identify any sources of error or uncertainty; assumes all data and processes are error-free.	Recognizes that errors exist but provides only a vague list without explaining how they arise or propagate through the model.	Correctly identifies major error sources (e.g., positional, attribute, classification) at each processing stage and describes how they compound through the workflow.	Document and evaluate error propagation using various methods such as simulation; proposes mitigation strategies and communicates residual uncertainty in final outputs.