



Convergence Curriculum for Geospatial Data Science

I-GUIDE Education and Workforce Development Team



Introduction

The **Convergence Curriculum** for Geospatial Data Science is an integrative framework to prepare next-generation and current-generation students, scholars, and professionals to build the necessary knowledge, skills, and competencies to tackle convergence problems without requiring a series of 15-week courses.

The **multi-tiered curriculum** starts with 5 foundational knowledge threads to establish a common basis for individuals coming from diverse backgrounds.

Individuals begin to **integrate** skills, knowledge, methods, and technologies as they move up through Knowledge Connections and Knowledge Frames.

The pinnacle of the curriculum is Knowledge Convergence, which **combines** the previous competencies with pre-existing domain knowledge.

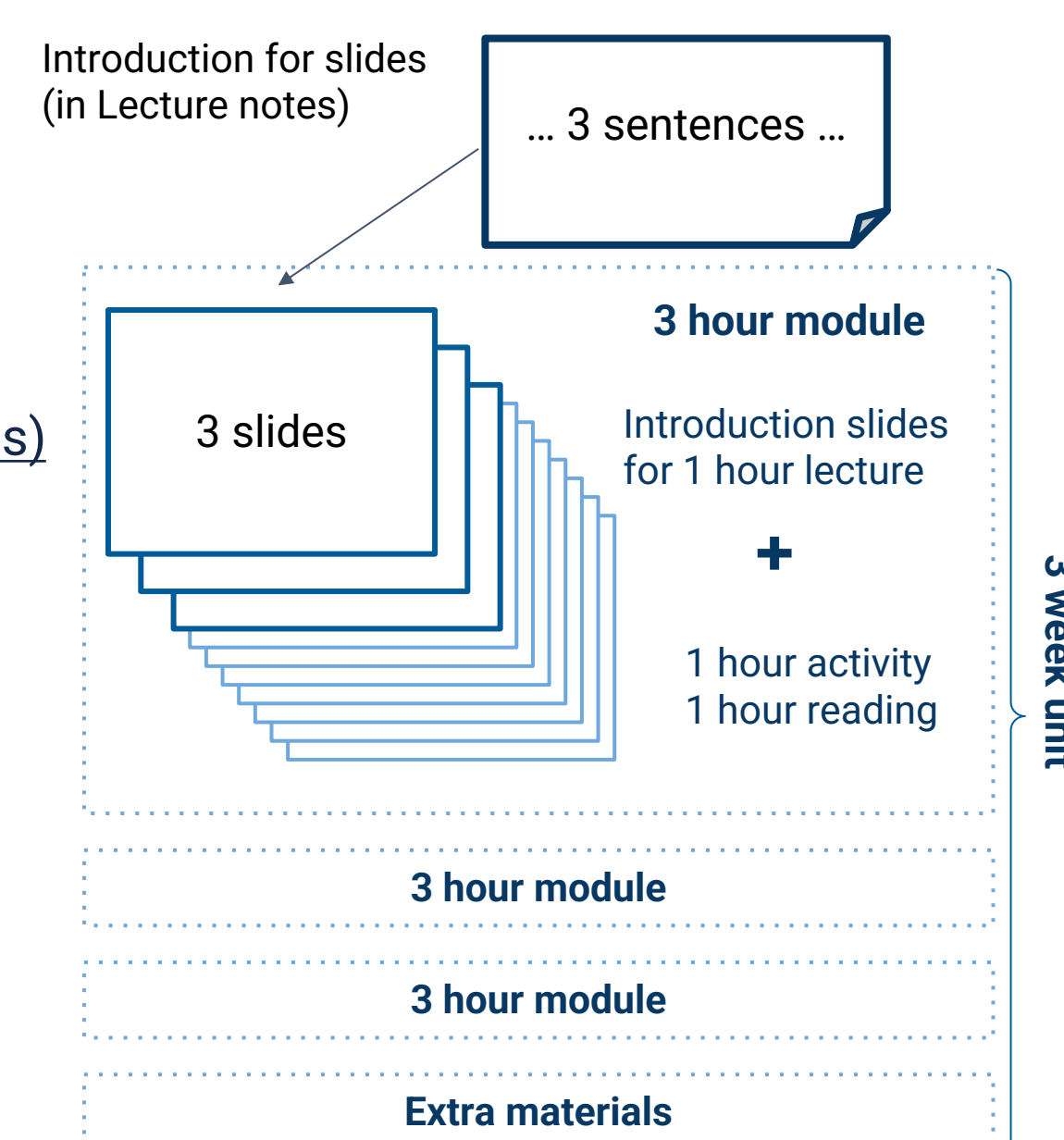
Modular Structure

Each component in the curriculum is exposed at varying depths. This configuration allows individuals to adapt their learning experience to match their own learning pathway.

Levels	Time	Elements	Bloom's Tax. (Verb)	Example LO
3 sentences	30 seconds	1) Definition 2) Key idea 3) Example	Remember (Define)	Define GeoAI
3 slides	3 minutes	1) Definition 2) Example 3) Question/Discussion	Understand (Recognize)	Recognize one example of GeoAI
3 hour module	3 hours	1) Lecture (1h) (+ notes and key points) 2) Hands-on activity (1h) 3) Reading & reflection (1h)	Apply (Use)	Use GeoAI in an example problem
3 week unit	3 weeks	1) 3, 3h Modules 2) 3, 1h Lectures (additional) 3) 1, Mini-project	Analyze / Evaluate (Outline)	Outline core components of a GeoAI model
3 week project	3 weeks	1) 3, Project-related activities 2) 1, Timeline 3) 1, Grading rubric	Create (Develop)	Develop a prototype GeoAI model

Efficient re-use

- Use existing OERs (Open Education Resources) when available
- Organize OERs to serve multiple learning pathways
- Structure elements to be used in multiple levels and settings



3 sentence Example

Aging Dams (in 3 sentences)

The potential for the failure of aging dams requires an understanding of how changing climate affects the chance of high precipitation events that could lead to the failure by overtopping of the dams. It requires a knowledge of statistics and machine learning to quantify the risk of dam failure and to predict which areas or critical infrastructure or populations downstream of the dam. Finally, an understanding of the social and economic impacts of dam failure, and of the governance and response planning of the dams is needed through social sciences for proper communication, understanding the chain of events that could lead to actual impacts and for risk mitigation.

Credit: Upmanu Lall

Convergence Curriculum Design

