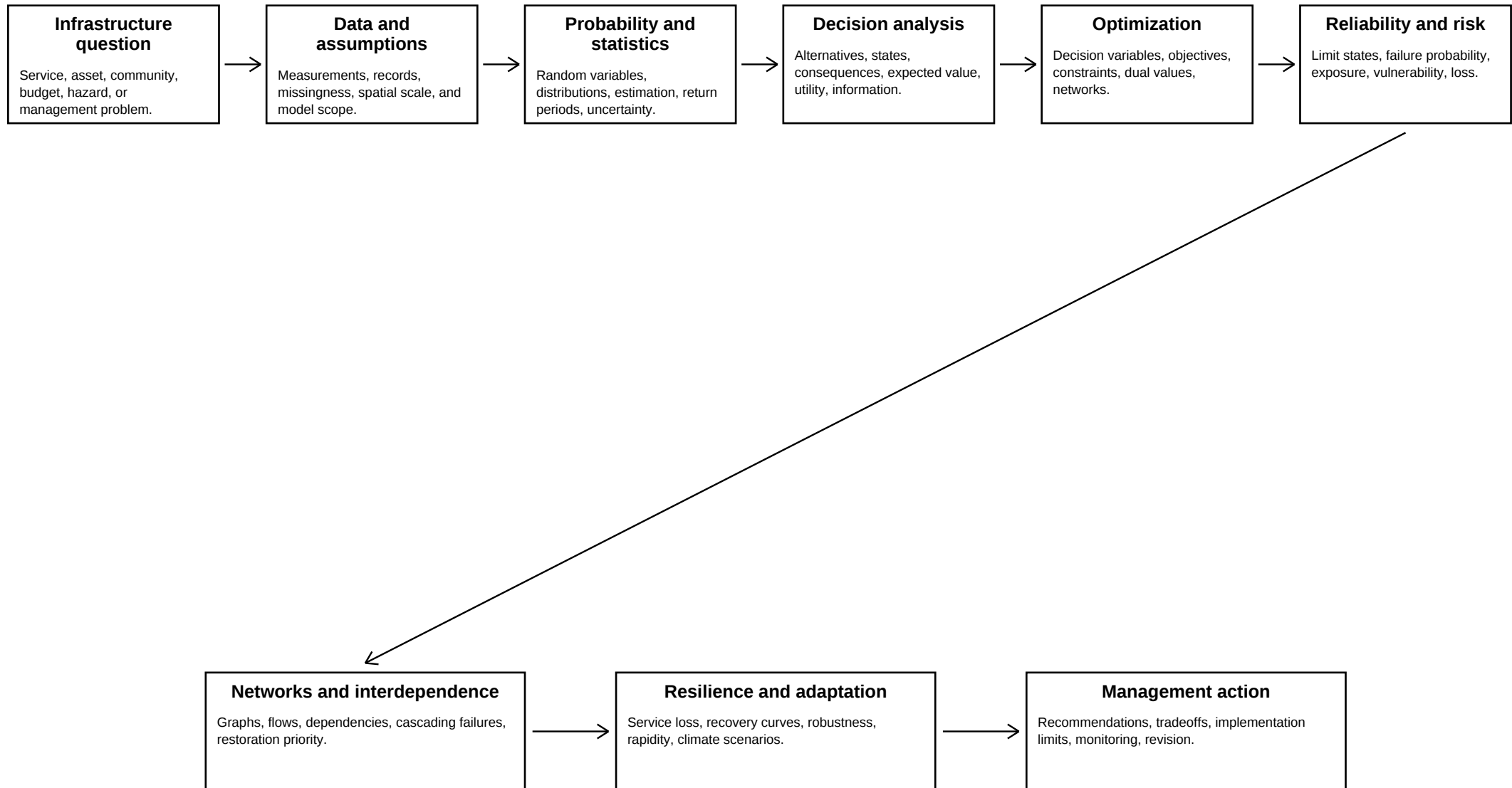


CE 637 Course Roadmap and Thoughtmap

Infrastructure decisions move from uncertain reality to defensible action through models, assumptions, and interpretation.



Mathematical thread: events, random variables, expectations, conditional probabilities, decision variables, objectives, constraints, graphs, transition matrices, reliability functions, and loss/recovery curves

How the Course Builds One Layer at a Time

1. Describe

Name the infrastructure service, boundary, stakeholders, performance measure, and decision time scale.

2. Quantify uncertainty

Represent uncertain demand, loading, deterioration, hazards, or costs with data and probability.

3. Choose under uncertainty

Compare actions using expected value, utility, risk attitude, and value of information.

4. Optimize scarce resources

Allocate budgets, crews, capacity, inspections, or upgrades subject to physical and institutional constraints.

5. Test reliability and risk

Translate failures into service consequences, losses, recovery, and resilience metrics.

6. Communicate action

Explain assumptions, sensitivity, fairness, implementation limits, and what must be monitored next.

How to use this roadmap

At the start of each lecture, locate the current layer and ask what bridge connects it to the previous layer.

The goal is to see one infrastructure problem through data, decision, optimization, reliability, network, and management lenses.