

Week 1: Introduction to Simulation and Modeling

- Understand the basics of simulation and its applications.
- Explore different modeling approaches, including agent-based, system-based, and other forms of modeling.
- Familiarize yourself with Machinations.io or AnyLogic user interface.

Week 2: Getting Started with Machinations.io or AnyLogic

- Install and set up Machinations.io or AnyLogic.
- Learn the basic functionalities and features of the tool.
- Create a simple simulation model using the tool.

Week 3: Agent-based Modeling Principles

- Understand the principles of agent-based modeling.
- Learn about agents, attributes, and behaviors in agent-based models.
- Develop a basic agent-based model using Machinations.io or AnyLogic.

Week 4: System Dynamics Modeling

- Explore system dynamics modeling concepts and techniques.
- Create stock and flow diagrams to represent dynamic systems.
- Simulate feedback loops and understand their impact on system behavior.

Week 5: Discrete Event Modeling

- Understand the principles of discrete event modeling.
- Learn how to model events, queues, and processes.
- Build a discrete event model using Machinations.io or AnyLogic.

Week 6: Monte Carlo Simulation

- Explore Monte Carlo simulation and its applications.
- Learn how to incorporate random variables into models.
- Perform Monte Carlo simulations using Machinations.io or AnyLogic.

Week 7: System Optimization and Sensitivity Analysis

- Understand the concepts of system optimization and sensitivity analysis.
- Learn optimization techniques to improve system performance.
- Perform sensitivity analysis on your model using Machinations.io or AnyLogic.

Week 8: Agent-based Model Calibration and Validation

- Understand the importance of model calibration and validation.
- Learn techniques for calibrating and validating agent-based models.
- Apply calibration and validation methods to your agent-based model.

Week 9: Discrete Event Simulation Analysis

- Explore techniques for analyzing discrete event simulation results.
- Learn how to interpret and draw insights from simulation output data.

- Analyze a discrete event simulation using Machinations.io or AnyLogic.

Week 10: Scenario Development and Analysis

- Learn how to develop scenarios for simulation models.
- Explore techniques for scenario analysis and comparison.
- Use Machinations.io or AnyLogic to simulate and analyze different scenarios.

Week 11: Optimization and Decision Support

- Apply optimization techniques to improve decision-making.
- Learn how to use simulation models to support decision-making processes.
- Use Machinations.io or AnyLogic to inform decision-making based on simulation outputs.

Week 12: Hybrid Modeling Approaches

- Explore hybrid modeling approaches that combine different modeling techniques.
- Understand how to integrate agent-based, system-based, and other models.
- Build a hybrid model using Machinations.io or AnyLogic.

Week 13-15: Advanced Modeling Techniques

- Study advanced modeling techniques such as machine learning integration, agent-based modeling with reinforcement learning, or system dynamics with optimization.
- Learn how to apply these techniques using Machinations.io or AnyLogic.
- Work on a project to implement and analyze an advanced simulation model.

Week 16: Model Visualization and Analysis

- Learn how to effectively visualize and analyze simulation model outputs.
- Use various visualization techniques to present simulation results.
- Perform statistical analysis on simulation data.

Week 17: Model Documentation and Reporting

- Understand the importance of model documentation.
- Learn how to document and report simulation models.
- Present your model and findings in a clear and concise manner.

Week 18: Project Work and Wrap-up

- Work on a substantial project using Machinations.io or AnyLogic to develop and analyze a complex simulation model.
- Present your project to the class or peers.
- Reflect on your learning journey and identify areas for further exploration.