

Syllabus, “Agent-Based Model Implementation”

Dr. Nazia N. Arbab, Spring 2017

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Office hours: By appointment and 3.00 pm - 5.00 pm weekdays

Meeting time and location: Tuesdays 12:30 pm -3:30 pm CRL 110

Class Web Site: <http://crl.rutgers.edu/seminars.html>

Description: This course will introduce graduate students from both social and natural science backgrounds to agent-based modelling approaches. Students will learn how to implement agent-based models for various research questions. The short course will cover approaches and examples from disciplines such as forestry, ecology, entomology, biodiversity, land use change and water shed management.

This 4 day short course will provide model processing strategy to analyze systems from a bottom up approach (scaling from a local to regional level). There will be a special focus on using human-environmental interactions. We will discuss using Netlogo and its GIS extension. Spatial processes, analysis, and modeling can all be extended and enhanced through the use of more sophisticated packages such as python, RePast, SWARM, MASON or any other languages of student's choice.

Familiarity with GIS is a plus. Attendees must bring their own laptop with Wi-Fi/wireless capabilities. Prior to the workshop, attendees must install the free Netlogo software on their laptops.

Learning Goals:

Goal 1: Explain basic deductive, inductive and abductive methods and concepts.

Goal 2: Describe the causality and dynamic process, process for phenomenon representation.

Goal 3: Create a model framework to understand the relationship between observed patterns and the process that create these patterns in the field of ecology, evolution and natural resource management.

Goal 4: Develop a comprehensive understanding of how to define ABM problem, model code, implementation and techniques of ABM.

Goal 5: Think critically and provide policy tools to assess the solutions in natural resource systems.

Goal 6: Demonstrate the ability to design ABM models and interpret the data.

Goal 7: Deepen spatial thinking skills to understand the relationships between local dynamics and the impacts of these dynamics on large complex natural resource systems.

Time	Day 1	Day 2	Day 3	Day 4
12.30 – 2.00	Introduction, types of models inductive, deductive and abductive model reasoning	Implementation and programming of an agent-based model	Spatially explicit agent-based ABM/GIS integration	Addressing and dealing with stochasticity and uncertainty in the ABM framework
2.15- 3.30	Introduction to Netlogo, Netlogo model exploration	Parameterization, scenario analysis Group exercise	Types of socio-environmental models, The ODD protocol modelling	Model testing/validation project reports, course feedback, publication outlets, group photo