

**UNIVERSITY OF FLORIDA**  
Department of Geography  
GEO3930 Spatial Agent Based Modeling

**INSTRUCTOR INFORMATION:**

<b>Instructors:</b>	Dr. Nicolas Gauthier Dickinson Hall 376	Dr. Gabriela Hamerlinck Turlington 3122   352.294.9051
<b>Office Hours:</b>	By appointment, please email to schedule	Wednesday 2:00 pm-5:00 pm Thursday 1:00 pm – 4:00 pm (or by appointment)
<b>E-Mail:</b>	nicolas.gauthier@ufl.edu	ghamerlinck@ufl.edu

**COURSE INFORMATION:**

<b>Time:</b>	Monday 10; Wednesday 9-10 (M 4:05 pm – 6:00 pm; W 5:10 pm – 6:00 pm)
<b>Location:</b>	Turlington Hall 3006

**COURSE DESCRIPTION:**

This course will introduce the spatial, environmental, and computational science to use agent based modeling (ABM) techniques as a means of modeling human-environmental interactions. Emphasis will be placed on spatial processes as we apply ABMs in areas such as agriculture, forestry, biodiversity, habitat degradation, interactions between human populations and nonhuman species, urban models, and civil violence. Students will use NetLogo to develop their own ABMs.

**STUDENT LEARNING OUTCOMES:**

After completing this course students should be able to:

1. Explain the cyclical nature of model based science.
2. Interpret and construct ODD summaries for ABMs in literature.
3. Make use of basic coding concepts in NetLogo (e.g. if-then statements, for loops, etc.).
4. Compose, modify, and design ABMs using NetLogo to observe, test, and control their models.
5. Appraise spatial data to address a range of scientific questions within an ABM.

**RECOMMENDED TEXT:**

Railsback, S. F., & Grimm, V. (2019). *Agent-based and individual-based modeling: a practical introduction*. Princeton university press. 2<sup>nd</sup> edition. \*Available through Course Reserves. The instructors have a few reference copies for classroom use.

## **LIST OF GRADED WORK:**

### **1. Class Wiki (5 posts x 20 pts=100 points)**

Students will post three questions and two responses to the collaborative class wiki to facilitate their understanding of NetLogo and coding. Rubric and examples are available on Canvas, where all posts will be completed and submitted.

### **2. Informal Progress Reports (80 points)**

The informal progress reports correspond to the NetLogo tutorials that are introduced in Unit 1. Each student will provide a brief summary of their progress through each tutorial by updating the information in the “info” tab of the NetLogo GUI. The .nlogo code file will be submitted via Canvas after each tutorial.

### **3. Formal Progress Reports (5 x 25 pts=125 points)**

There are three “ABM Exploration” activities during Unit 2 of the semester where we will use class time to replicate and explore a published model. Students will then expand the model in small groups using NetLogo. Each group will complete a weekly progress report on their work to summarize their expansion and submit it to Canvas. Each formal progress report also contains a brief individual summary of each student’s contributions to the group accomplishments and plans. Template and rubric are available on Canvas.

### **4. Final Project (175 points)**

Students will individually conceptualize an ABM to address a research question of their own design by producing an ODD summary. Each student will compose and present their ABM design during the last week of the semester. The presentation is paired with a final project write-up, which is a complete ODD summary of the ABM. Rubrics and in-class work time will be provided. (75 pts for the presentation, 100 pts for ODD summary).

### **5. Participation (20 points)**

Consistent informed, thoughtful, and considerate class participation is expected and will be evaluated using the rubric below. The instructor will inform you of your participation grade to date during the second unit and schedule a conference if you are earning below 70% of the possible points.

NOTE: If you have personal issues that prohibit you from joining freely in class discussion, e.g., shyness, language barriers, etc., see the instructor as soon as possible to discuss alternative modes of participation.

**Total semester points: 500**

Participation Grading Rubric:

	<b>High Quality</b>	<b>Average</b>	<b>Needs Improvement</b>
Informed: Shows evidence of having done the assigned work. This includes class preparation (i.e. posting questions to Canvas prior to class)			
Thoughtful: Shows evidence of having understood and considered issues raised.			
Considerate: Takes the perspective others into account.			

**GRADING SCALE & GPA EQUIVALENT:**

<b>A</b> 100%-94%	<b>A-</b> <94%-90%	<b>B+</b> <90%-87%	<b>B</b> <87%-84%	<b>B-</b> <84%-80%	<b>C+</b> <80%-77%
<b>C</b> <77%-74%	<b>C-</b> <74%-70%	<b>D+</b> <70%-67%	<b>D</b> <67%-64%	<b>D-</b> <64%-61%	<b>E</b> <61%

**Note:** A grade of C- is not a qualifying grade for major, minor, Gen Ed, or College Basic distribution credit. For further information on UF's Grading Policy, see:

<https://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx#hgrades>

<http://www.isis.ufl.edu/minusgrades.html>

## COURSE SCHEDULE

NOTE: the syllabus is a guideline and there may be changes to the class schedule.

	Monday	Wednesday	Assignments
<b><i>Unit 1: Introduction to Spatial ABMs &amp; NetLogo</i></b>			
<b>Week 1</b>	No class	Class structure, utility of ABMs, GoT Tutorial 1	
<b>Week 2</b>	Lecture: What is modeling Activity: GoT Tutorial 2	Activity: GoT Tutorial 3 Lecture: spatial data & ABMs	Post to Class Wiki
<b>Week 3</b>	No class: Holiday	Activity: GoT Tutorial 4 Lecture: Networks	Post to Class Wiki
<b>Week 4</b>	Activity: GoT Tutorial 5 Lecture: Prisoner's dilemma	Activity: GoT Tutorial 6 Lecture: ODD protocol	Post to Class Wiki
<b>Week 5</b>	Activity: GoT Tutorial 7 Lecture: seasonality	Activity: GoT Tutorial 8 Lecture: resource availability	Post to Class Wiki
<b>Week 6</b>	Activity: GoT Tutorial 9 Lecture: What we know about modeling now	Lecture: Intro to explorations	Post to Class Wiki
<b><i>Unit 2: ABM Exploration</i></b>			
<b>Week 7</b>	Exploration 1 (instructor guided)		Progress Report 1
<b>Week 8</b>	Introduction to exploration topics		
<b>Week 9</b>	Exploration 2 (group work time)		Progress Report 2
<b>Week 10</b>			Progress Report 3
<b>Week 11</b>	Exploration 3 (group work time)		Progress Report 4
<b>Week 12</b>			Progress Report 5
<b>Week 13</b>	Guest speakers		
<b>Week 14</b>	Introduction to the final project	No class: Holiday	
<b><i>Unit 3: Final Project</i></b>			
<b>Week 15</b>	Final project individual work time		
<b>Week 16</b>	Presentations	Presentations	Final Presentation; Peer Reviews
<b>Finals Week</b>	Submit your final project		Final Project Write-up

This course will use NetLogo to develop, test, and analyze ABMs. NetLogo is a free software available for download to your computer, or through UF Apps. To facilitate our course activities, we will use the computer lab machines. You are welcome to bring your laptop, though the instructors cannot guarantee troubleshooting on personal computers.

## **CLASSROOM POLICIES:**

### **Class Attendance and Make-Up Policy**

Class attendance is expected. Each unexcused absence will result in a 10 point reduction in the final grade. Excused absences are consistent with university policies in the undergraduate catalog (<https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx>) and require appropriate documentation.

Students who can demonstrate that they were unable to submit an assignment by the deadline due to an excused absence and who can provide appropriate documentation for the absence will be given a reasonable period of time to make up the late work.

### **Late Policy:**

A class roll will be passed around at the beginning of class. If a student is late, he or she will have to sign the roll after class. Such lateness distracts other students and the instructor and will affect the student's final participation grade. Students will lose 1% from their final grade each time they arrive late.

### **Students Requiring Accommodations**

Students with disabilities who experience learning barriers and would like to request academic accommodations should connect with the Disability Resource Center by visiting <https://disability.ufl.edu/students/get-started/>.

It is important for students to share their accommodation letter with their instructor and discuss their access needs, as early as possible in the semester.

### **Course Evaluation**

Students are expected to provide professional and respectful feedback on the quality of instruction in this course by completing course evaluations online via GatorEvals. Guidance on how to give feedback in a professional and respectful manner is available at [gatorevals.ua.ufl.edu/students/](http://gatorevals.ua.ufl.edu/students/). Students will be notified when the evaluation period opens, and can complete evaluations through the email they receive from GatorEvals, in their Canvas course menu under GatorEvals, or via [ufl.bluera.com/ufl/](http://ufl.bluera.com/ufl/). Summaries of course evaluation results are available to students at [gatorevals.ua.ufl.edu/public-results/](http://gatorevals.ua.ufl.edu/public-results/).

### **Class Demeanor**

Students are expected to arrive to class on time and behave in a manner that is respectful to the instructor and to fellow students. Please avoid the use of cell phones and restrict eating to outside of the classroom. Opinions held by other students should be respected in discussion, and conversations that do not contribute to the discussion should be held at minimum, if at all.

### **University Honesty Policy**

UF students are bound by The Honor Pledge which states, "We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honor and integrity by abiding by the Honor Code. On all work submitted for credit by students at the University of Florida, the following pledge is either required or implied: "On my honor, I have neither given nor received unauthorized aid in doing this assignment."

The Honor Code (<https://www.dso.ufl.edu/sccr/process/student-conduct-honor-code/>) specifies a number of behaviors that are in violation of this code and the possible sanctions.

Furthermore, you are obligated to report any condition that facilitates academic misconduct to appropriate personnel. If you have any questions or concerns, please consult with the instructor or TAs in this class.

### Counseling and Wellness Center

Contact information for the Counseling and Wellness Center:

<http://www.counseling.ufl.edu/cwc/Default.aspx>, 392-1575; and the University Police Department: 392-1111 or 9-1-1 for emergencies.

### Writing Studio

The writing studio is committed to helping University of Florida students meet their academic and professional goals by becoming better writers. Visit the writing studio in 302 Tigert Hall for one-on-one consultations and workshops, or online at <http://writing.ufl.edu/writing-studio/>.

### Grade Disputes:

Should a student wish to dispute any grade received in this class (other than simple addition errors), the dispute must be in writing and be submitted to the instructor within a week of receiving the grade. The dispute should set out very clearly, the grade that the student believes the assignment should have received as well as why he or she believes that he or she should have received such a grade.

### In-Class Recordings

Students are allowed to record video or audio of class lectures. However, the purposes for which these recordings may be used are strictly controlled. The only allowable purposes are (1) for personal educational use, (2) in connection with a complaint to the university, or (3) as evidence in, or in preparation for, a criminal or civil proceeding. All other purposes are prohibited. Specifically, students may not publish recorded lectures without the written consent of the instructor.

A “class lecture” is an educational presentation intended to inform or teach enrolled students about a particular subject, including any instructor-led discussions that form part of the presentation, and delivered by any instructor hired or appointed by the University, or by a guest instructor, as part of a University of Florida course. A class lecture does not include lab sessions, student presentations, clinical presentations such as patient history, academic exercises involving solely student participation, assessments (quizzes, tests, exams), field trips, private conversations between students in the class or between a student and the faculty or lecturer during a class session.

Publication without permission of the instructor is prohibited. To “publish” means to share, transmit, circulate, distribute, or provide access to a recording, regardless of format or medium, to another person (or persons), including but not limited to another student within the same class section. Additionally, a recording, or transcript of a recording, is considered published if it is posted on or uploaded to, in whole or in part, any media platform, including but not limited to social media, book, magazine, newspaper, leaflet, or third party note/tutoring services. A student who publishes a recording without written consent may be subject to a civil cause of action instituted by a person injured by the publication and/or discipline under UF Regulation 4.040 Student Honor Code and Student Conduct Code.