

## “Individual-based Modeling of Microbial Processes & Interactions” Course Description

**Course title:** Individual Based Modelling of Microbial Processes & Interactions

**Language:** English

**Point (ECTS):** 5

**Course type:** PhD course

**Schedule:** June 8-13, 2008

**Scope and form:** Lectures, computer exercises (guided, individual, group), student presentations

**Type of assessment:** Attendance and Exercises

**Evaluation:** Pass/No Pass

**Prerequisites:** N/A

### General course objectives:

The course will make participants familiar with concepts and tools used for the individual-based modelling of microbial interactions. They will be introduced to a wide range of existing applications of Individual Based -models and will be trained to the use of the iDynoMiCs platform, a new modular and open-source software dedicated to microbial Individual Based -simulations. In addition to the technical training, relation between Individual Based -models, classical models and direct observations will be assessed.

### Learning objectives:

A student who has met the objectives of the course will be able to:

1. Understand and describe Individual Based -models principles
2. List main applications of Individual Based -models in microbial ecology
3. Set-up and use existing Individual Based -models
4. Formulate his specific needs and develop his own model
5. Produce numerical and graphical outputs
6. Analyse and evaluate simulation results in regard with parameter sensitivity, steady-state stability, and comparison with real data
7. Take part to the further developments of the software

### Content:

The course will introduce the use of modeling and more specifically of individual-based modeling in microbial ecology. Several applications of biofilm models will be detailed and the main dynamics occurring in biofilms will be described.

Then the practical implementation of these concepts will be presented: after a general introduction to the Java programming language, students will learn how to use the main modules and solvers of a new software platform for individual-based modeling of biofilms. They will get familiar with the software thanks to the implementation of simple case-studies and then will have the opportunity to start the design and implementation of their own model. Meanwhile the relation with other modeling framework like continuous modeling or neutral modeling will be addressed.

**Remarks:**

The course makes extensive use of group/cooperative learning. Group assignments are made by the instructors at the outset of the course. Individual contributions to group project will be explicitly assessed. Specific computer skills are not required but average informatics proficiency is desirable.

**Instructors:**

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