



# Master Marine Biology



# Practical modelling for Biologists

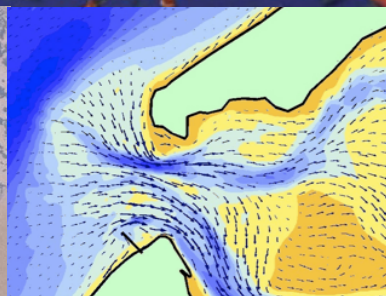
By Johan van de Koppel

Jan 6-24, 2020  
RUG Groningen



## Contacts

<http://www.rug.nl/masters/marine-biology>  
<https://www.facebook.com/MarineBiologyGroningen>



university of  
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## **Practical (Numerical) Modelling for Biologists**

January 6-24, 2020, RUG Groningen

Mathematical modelling has become an important tool throughout the natural sciences. Especially when the dynamics of natural populations, be it molecules within a cell, a population of seals in an estuary, or the global importance of termites, are concerned, modelling is an indispensable tool, as it can help understand how species interaction can cause unexpected, nonlinear dynamics in ecosystems. When modelling marine systems, this often involves not only biological interactions, but also the physical and chemical environment.

This course aims to teach the topic and the tools involved in the modelling of marine as well as non-marine systems. Different from many other courses, it takes a multidisciplinary approach, and introduces the student to the modelling of interactions of the biological components with their abiotic environment. The course moreover focuses on computational (i.e. computer calculations) rather than on mathematical (i.e. symbol manipulation) techniques.

In the course, the following subjects will be treated:

- Resource modelling
- Modelling ecosystem engineering and positive feedback
- Spatial modelling: Advection/Diffusion
- Self-organization in estuarine ecosystems
- Modelling water flow: Navier Stokes & shallow water equations
- Individual-based modelling
- Cellular automata: (wave) disturbance modelling
- Movement & search of animals

The course will consist of three parts. The first part will be a series of lectures that will provide an introduction into the most important topics within modelling. Using practical exercises, the student will get acquainted with the basic modelling techniques, and learn how to use the models to answer ecological and environmental problems. In the last 1.5 weeks of the course, the students will do a modelling assignment where they independently develop (e.g., not provided by the lecturer) a model to answer a scientific question, as group work. On the last day of the course, the students will report on their work in a poster presentation.

### **Admission:**

The course is part of the Master Program in Marine Biology at the University of Groningen. The topic is geared to a marine setting, although the skills that you will learn are very general and can also be used in modelling of terrestrial or freshwater systems.

The course is also open to other master or PhD students who are not enrolled at the University of Groningen and who would like to participate.

### **Requirements:**

An academic Bachelor's degree in any field of biological sciences. This includes, but is not restricted to, ecology, evolution, physiology, genetics, molecular biology, microbiology, theoretical biology and behavior.

### **For general inquiries:**

[Johan.van.de.Koppel@nioz.nl](mailto:Johan.van.de.Koppel@nioz.nl)

Research website: <http://www.johanvandeKoppel.nl>

Facebook: <https://www.facebook.com/johan.van.de.koppel>

### **For admission:**

<http://www.rug.nl/masters/marine-biology>

<https://www.facebook.com/MarineBiologyGroningen>

Admission for RUG students: Ocasys, or email above.

### **PhD & external master students:**

PhD students can register via the course webpage of the Research School Ecology & Evolution : <https://www.rug.nl/research/ecology-and-evolution/phdcourses/>

External Master students can register

via the Exchange Office, [exchange.science@rug.nl](mailto:exchange.science@rug.nl)

This course is given in collaboration with the Royal Netherlands Institute for Sea Research (NIOZ-Yerseke).

