

# USING MODELLING AS A TOOL FOR EXPERIMENTAL DESIGN

FREE training course

DATE: 12 MARCH 2024 9:00 - 14:30 HRS (CEST) LOCATION: ONLINE



## COURSE DESCRIPTION

Participants will be trained in the use of numerical models as efficient tools for designing research experiments. They will gain a good understanding of the interaction between biological and physical factors within aquaculture research, including growth, nutrition, waste production, water quality, water treatment and hydrodynamic flow fields. The course is built around an aquaculture virtual lab that participants will be able to test.

## TARGET AUDIENCE

Aquaculture researchers with a non-modelling background. Can also be useful for students in aquaculture, both from technology and biology.

## OUTLINE COURSE

### LECTURE 1: USING NUMBERS IN AQUACULTURE RESEARCH

**Lecturer:** Martin Føre (NTNU)

**Learning Goals:**

- Understand how to use numbers in aquaculture research, with a focus on modelling
- Use digital twins as potential future tools
- Demonstrate the use of mathematics in aquaculture applications

### LECTURE 2: GROWTH MODELS - NUTRITION AND WASTE PRODUCTION MODULES

**Lecturer:** Orestis Stavrakidis-Zachou (HCMR)

**Learning Goals:**

- Illustrate updated growth models
- Demonstrate how nutritional dynamics is linked with growth
- Analyse how waste production depends on nutritional dynamics and growth

### LECTURE 3: GROWTH MODELS - NEW SPECIES

**Lecturer:** Orestis Stavrakidis-Zachou (HCMR)

**Learning Goals:**

- Demonstrate new growth model for pikeperch
- Explain new growth model for seabass
- Validate new models with independent data-sets

### LECTURE 4: FISH BEHAVIOUR MODEL

**Lecturer:** Martin Føre (NTNU)

**Learning Goals:**

- Describe basic structure of an individual based fish behaviour model
- Demonstrate main model equations and components
- Apply model validation and applications

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## LECTURE 5: FLOW FIELD MODELLING

**Lecturers:** Morten Alver (NTNU) and Jan Urban (JU)

### Learning Goals:

- Apply updated flow model for virtual portal
- Practice fundamentals of flow modelling
- Employ model validation and application to typical tanks

## LECTURE 6: INTEGRATED MODEL OF ENVIRONMENT AND FISH BIOLOGY

**Lecturer:** Biao Su (SINTEF)

### Learning Goals:

- Illustrate the framework FhSim for simulation of environment and fish in a common system
- Apply digital twins in aquaculture
- Examine different applications relevant for aquaculture research

## LECTURE 7: INTRODUCTION TO AND USE OF THE VIRTUAL LABORATORY STRUCTURE

**Lecturer:** Finn Olav Bjørnson (SINTEF)

### Learning Goals:

- Describe the virtual lab structure and components
- Explain how to set up virtual experiments in aquaculture (walkthrough)

## PRACTICAL EXERCISES

**Lecturers:** Finn Olav Bjørnson (SINTEF) and Jan Urban (JU)

### Learning Goals:

- Short background and explanation of two exercises to implement the learnings on using modelling as a tool for experimental design
- 2 practical exercises

## PRACTICAL INFORMATION

**Location:** Online Course. Full details on access will be provided after registration

**Date & Time:** Live lecture - 12 March 2024, from 9:00 to 14:30 hrs CEST (Central European Summer Time)

A recorded version of the course will be publicly available after the course date, registration will be required (further details will follow after the live lecture)

**Language of instruction and materials:** English

**Fees:** Course attendance is free, thanks to EU Horizon 2020 Funding

## REGISTRATION

**Step 1. Complete your registration request through the [form](https://aquaexcel.eu/training-courses/training-course-2-using-modelling-as-a-tool-for-experimental-design/) that can be found on the official AQUAEXCEL3.0 website: [aquaexcel.eu/training-courses/training-course-2-using-modelling-as-a-tool-for-experimental-design/](https://aquaexcel.eu/training-courses/training-course-2-using-modelling-as-a-tool-for-experimental-design/)**

**Step 2. Send your completed GDPR form (available at the link above) to [karla@erinn.eu](mailto:karla@erinn.eu)**

**REGISTRATION DEADLINE = 11 March 2024, 9:00 hrs (CEST)**