Course: Modelling Cancer

credits: 10

Course code	BFVH24MODELLEREN
Name	Modelling Cancer
Study year	2025-2026
ECTS credits	10
Language	Dutch, with parts in English
Coordinator	D.R.M. Langers

Modes of delivery	Lecture Project-based learning Tutorial
Assessments	Casus Modelleren - Other assessment Verdiepend Model - Other assessment

Learning outcomes

1. You process and analyse oncology data from a variety of data sources, using quantitative models commonly used in the field.
2. You critically evaluate and interpret outcomes of data analysis and draw biologically relevant conclusions based on these findings.
3. You search and study relevant literature on modelling techniques and express their operation using appropriate terminology.
4. You select available software to realise and evaluate models or, if necessary, develop this software yourself to a certain extent.
5. You present methods used and results found in oral and written form in a way that is understandable to a fellow student.
6. You assess analysis logs of fellow students for comprehensibility and reproducibility and provide them with constructive comments.

Content

As a bioinformatician, you often work in the context of scientific or applied research. Your work then not only consists of applying techniques you already know, but you also continuously master new methods and develop your own tools to apply them.

This module consists of a ‘carousel’ with a number (~4) of introductory cancer cases, each lasting over a week. In alternating pairs, you will be introduced to methods that are often new and more advanced for you to perform an analysis on a question. Cases may vary according to availability and need, or may respond to current events, but can include, for example: dynamic models (e.g. differential equations, molecular dynamics); predictive models (hidden-markov models, convolutional neural networks, generative text); descriptive models (structural equation models, non-linear regression); statistical models (non-parametric statistics, Bayesian statistics); etcetera.

Halfway through the module, you formulate your own individual problem that allows you to either deepen the methods of analysis from a given case study, or explore another advanced modelling technique on your own. You independently study literature with information on the method in question, you evaluate software for usability or write your own routines in a programming language of your choice, and you gather relevant oncological data from available sources or partially generate them yourself in the form of a simulation.

Finally, you provide a biological interpretation of your outcomes and present them in the form of a scientific poster, preceded by a pitch.

In particular, this module builds on topics offered in the modules below:

Module 1.4.1 ‘The scientific cycle’
Module 2.1.2 ‘Genomics & Transcriptomics’
Module 2.3.2 ‘Machine Learning with Class(es)’
Module 2.4.1 ‘*Omics’

In terms of biological context, the content of this module links to the following parallel module:

Module 3.2.1 ‘Biology of Cancer’

Included in programme(s)

Bio-Informatics

School(s)

Institute for Life Science & Technology

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