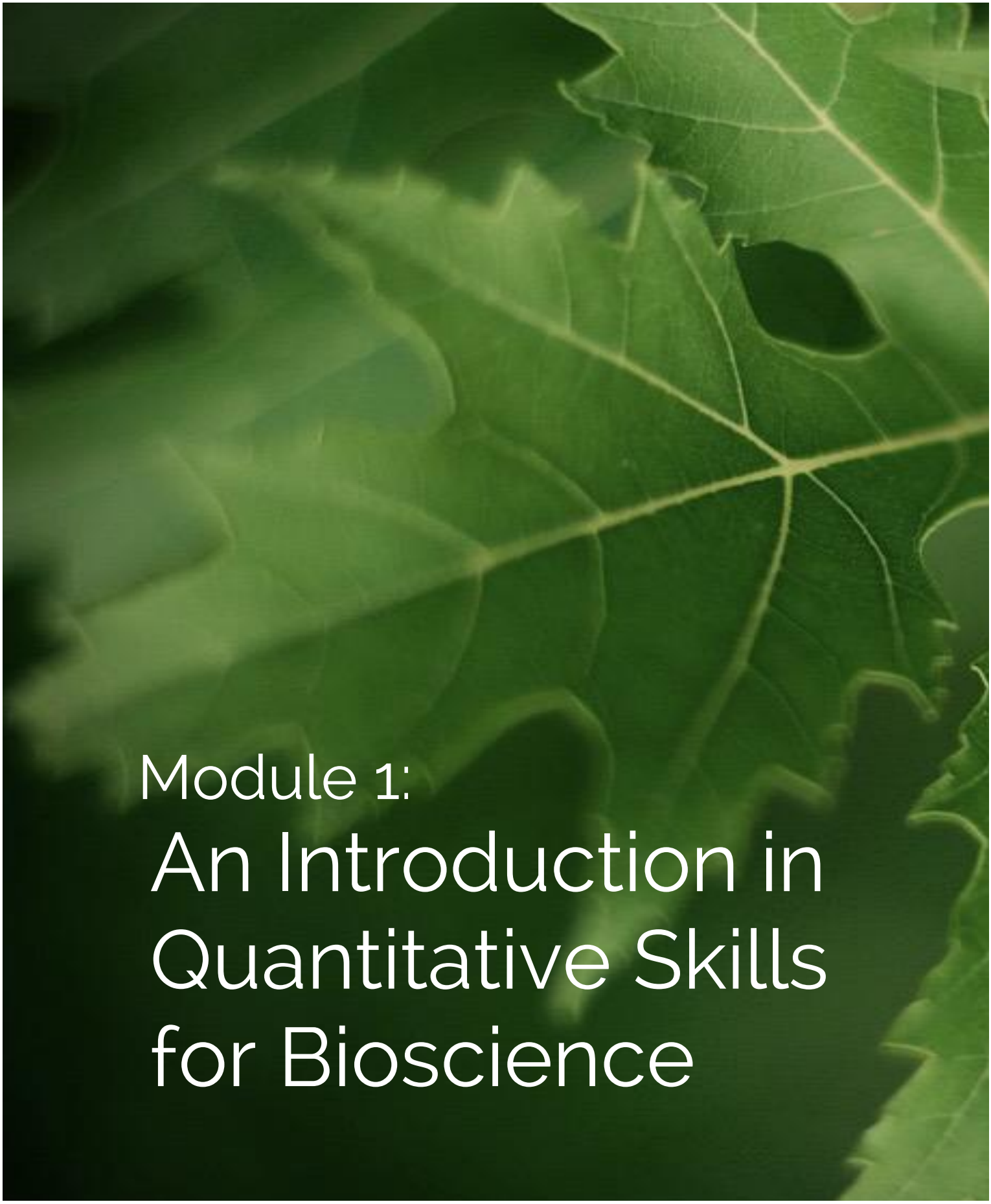
SYS MIC®

Maths and Computing training for Biology Researchers



Module 1:

An Introduction in Quantitative Skills for Bioscience

SysMIC is developed by a consortium of leading UK universities that have world-class expertise in bioscience research and distance learning.

Since 2012 we have welcomed over 1,000 UK researchers who collectively have completed 50,000 hours of training with us.

website: sysmic.ac.uk

email: sysmic-team@sysmic.ac.uk

location: University College London
G03 Anatomy Building
Gower Street
London, WC1E 6BT

Table of Contents

Introduction

Research work in the life sciences is increasingly interdisciplinary and quantitative in nature.

SysMIC provides training in these important areas; helping researchers to access new approaches and techniques, and to collaborate more effectively across discipline boundaries.

The SysMIC training programme was developed with support from the BBSRC and has been refined using feedback from the research community. Our comprehensive online materials allow flexible study and are fully supported by expert tutors.

Our modules are well established, forming a key component of several PhD training programmes, and a recognised means of CPD training for established and senior researchers.

This booklet provides some key information about SysMIC Module 1.

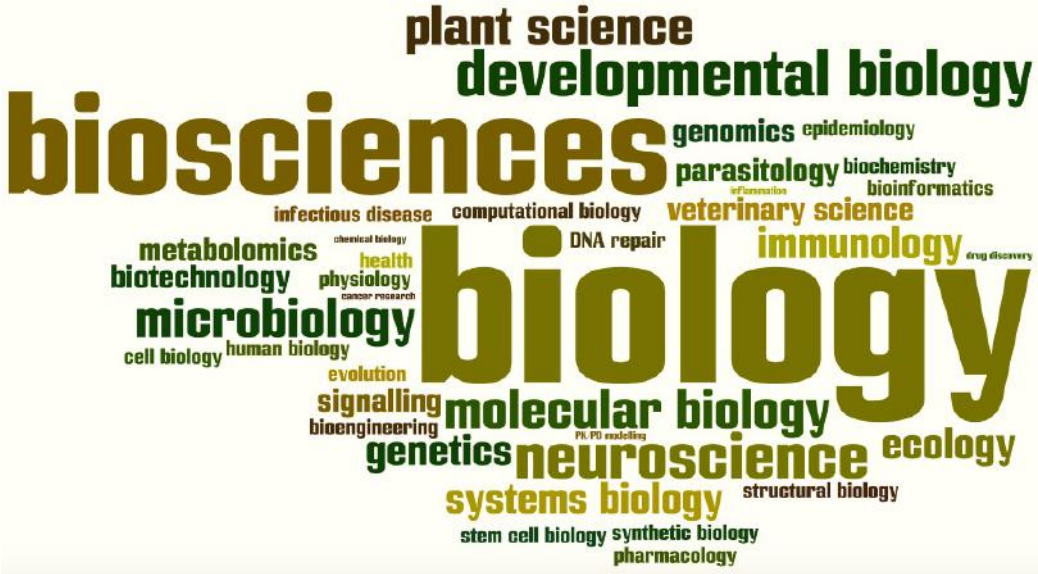


Illustration showing reported interests of SysMIC participants.

Participants of a SysMIC workshop working together on modelling exercises.

Module Overview

Module 1 covers the essential skills that are required to create and work with models of biological systems and analyse the related experimental data.

Sessions are delivered though a bespoke learning portal which includes in-depth reading materials, video tutorials, quizzes, exercises access to help from SysMIC tutors. Typically the module takes 6 months to complete requiring around 5 hours study per week.

The module is designed to be accessible to those with little prior experience of programming, and includes background materials to aid those who have not studied advanced level mathematics.

It is recommended that participants who have prior experience in programming also start with this module, as it introduces examples and contexts that are the foundation for further development in Module 2.

Content

Module 1 covers the following topics:

Computer Programming
- Programming using MATLAB
- Data analysis using R

Networks
- Network theory and analysis
- Using SimBiology
- Working with Petri nets

Modelling
- Mathematics for biological modelling
- Modelling reactions and gene regulation
- Simulation and analysis of ODE models

Statistics
- Sample distributions and the central limit theorem
- Hypothesis testing
- Analysis of gene expression data

Miniproject
- Investigation of a simple biological model

Sessions

The sessions in Module 1 typically include:

i) Step-by-step tutorials
These explain new technique or concept using a worked example that uses a biological context. These provide the core activity of each session and includes code examples and practice exercises with answers.

ii) Assignment exercises
These are embedded within each tutorial and provided so you can practice your skills and consolidate your learning. Help completing the assignments can be obtained from our tutors, and model answers are made available after submission.

iii) Online-quizzes
Where new mathematical concepts have been introduced we provide online quizzes. These are optional, but a good opportunity for you to practice and test your understanding.

iv) Background reading
Alongside the tutorials we provide materials that have been adapted from the Open University mathematics courses. These are provided so that you have the option study more deeply into the underlying mathematical concepts introduced in the course.

v) Help forums
For each session we have a dedicated forum where you can ask any question you have about the materials, exercises or quizzes. They also provide a bank of previous questions that have already been answered,

vi) A reflection activity
At the end of each session we ask you to complete a reflection activity. This forms a record of your learning in which you evaluate the skills you have developed and provides the opportunity to give feedback to the SysMIC team.

Assessment

To complete Module 1 you must complete 10 out of the 12 sessions, and write a short report on the results of your miniproject investigation.

Tutors will review and provide personal feedback on miniproject reports, if necessary you may be asked to act on their comments to correct your work.

We do not grade or provide feedback for the session quizzes or assignments, but may review them for additional evidence of your engagement with the course.

Certification

Upon completion of Module 1 you will receive a certificate with details of your training and achievements.

A digital copy of each certificate is stored and made accessible via the SysMIC site, enabling it to be digitally verified and added to online CVs.

Each module is worth 360 points on the Royal Society of Biology CPD scheme. These points can be used towards Chartered Biologist status.

For more information about SysMIC and examples of our training materials please visit our webpage at sysmic.ac.uk.

How to sign up

Module 1 has start dates in October and April each year.

The standard fee for Module 1 is £1,250. This covers full access to tutor support during your study, and continued access to the materials after you complete the course.

To register for the module send your details and preferred start date to sysmic-team@sysmic.ac.uk

Notes:

- Doctoral students who wish to take the module should discuss it with their supervisor, as they may have access to training grants that can fund course fees.

- Researchers who are affiliated with the BBSRC are eligible for a discounted fee. Please contact us for details.

Find out more about our modules at:

sysmic.ac.uk