** **

**Foundation Masterclasses 2022/2023 – Set 2**

**Primer for Mathematical Modelling for Biologists**

*optional for first- and second-year EASTBIO students*

*23/05/2023*

**Workshop leaders: Rodrigo García-Tejera** (University of Edinburgh, Centre for Regenerative Medicine)

**Date: 23 May 2023, 10:45-16:45**

**Location: Dundee, Dalhousie** [**1G01 IT Suite 1**](https://www.dundee.ac.uk/roombookings/catalogue/dalhousie1g01itsuite1/) **(Std)**

**Workshop description:**Mathematical models have been used to gain insight into a wide range of research areas, including cell biology, morphogenesis, disease dynamics, ecology, and epidemiology. In many scenarios, biological processes rely on tightly regulated interactions between several components. Dynamics may emerge that cannot be explained by the individual components alone. Here, mathematical models can be used to formally describe these interactions and can identify which components are most important in relation to the emerging dynamics of the system. The results of mathematical models can then be used to motivate experiments to further improve our understanding of the system.

Through lectures and practical examples, we will illustrate how mathematical modelling can be used to understand, investigate and simulate complex phenomena. We will focus on case studies, including modelling of interacting populations, pattern formation and cancer growth. The modelling concepts that are discussed in the morning session will be applied to practical (programming) examples in the afternoon.

**Learning outcomes:**

Participants will:

* Learn about the benefits of mathematical modelling of complex biological phenomena
* Gain insight into key methods used within mathematical biology (e.g., differential equations, agent-based models, statistical methods)
* Work with MATLAB code to investigate mathematical models
* Understand how mathematical models can be used to interpret experimental data and inform new experiments

**Training Schedule:**

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| 10:45-11:00 | Welcome |
| 11:00-11:30 | Why use mathematical models? |
| 11.45-12:30 | Methods in modelling: Part 1 |
| 12.45-13:30 | Methods in modelling: Part 2 |
| 13:30-14:45 | Lunch break |
| 14:45-15:15 | Introduction to programming activities |
| 15:15-16:45 | Programming activities |

**Participation requirements:**

No prerequisite knowledge of mathematics or programming is required. All participants are requested to have access to a computer with internet access and MATLAB installed in advance of the masterclass.

**Training web-page:**<http://www.eastscotbiodtp.ac.uk/foundation-masterclasses>

For **further info**, please email [enquiries@eastscotbiodtp.ac.uk](mailto:enquiries@eastscotbiodtp.ac.uk)