

Advice for new students in the MRes for Systems and Synthetic Biology

Below, you will find some advice that are the result of the feedback provided by alumni of the course you are going to embark on.

1. Mathematicians need to make the effort to **learn about biology**, and biologists need to make the effort to **learn about mathematics**. In that respect, the reference books listed below might be useful if you need to check some concepts or deepen your understanding of the modules.
2. **Reference books, papers and courses** (check the Imperial Library for availability):
 1. **[Design Principles of Genetic Circuits](#)**, Python Jupyter notebook course available online, Justin Bois & Michael Elowitz, Caltech
 2. **[Biomolecular Feedback Systems](#)**, ([available online](#)); in particular chapter 2 for a good recall of cellular biology and corresponding modelling at different levels of abstraction and chapter 5 for the analysis of simple synthetic biology models), D. del Vecchio, R. Murray
 3. **[Cell Biology by the Numbers](#)**, ([available online](#)) Ron Milo, Rob Philipps
 4. **[Nonlinear dynamics and chaos: with applications to physics, biology, chemistry, and engineering](#)**. Perseus Books. (A really brilliant book on nonlinear dynamics and chaos), S. Strogatz
 5. **[Array programming with NumPy](#)**, Charles Harris *et al.*, Nature, September 2020
 6. **[Engineering Mathematics](#)**, [K.A. Stroud](#), [Dexter J. Booth](#)
 7. **[Essential Cell Biology](#)**, [Bruce Alberts](#), [Dennis Bray](#), [Karen Hopkin](#), [Alexander Johnson](#), [Julian Lewis](#), [Keith Roberts](#), [Martin Raff](#), [Peter Walter](#)
 8. **[Physical Biology of the Cell](#)**, [Rob Phillips](#), [Jane Kondev](#), [Julie Theriot](#)
 9. **[Synthetic Biology - A Primer](#)**, [Paul S. Freemont](#), [Richard I Kitney](#), [Geoff Baldwin](#), [Travis Bayer](#), [Robert Dickinson](#), [Tom Ellis](#), [Karen Polizzi](#), [Guy-Bart Stan](#)
 10. **[Systems Biology and Synthetic Biology](#)**, Eds. [Pengcheng Fu](#), [Sven Panke](#)
3. An introduction course on **[Modelling in Biology](#)** is taught in the Department of Bioengineering by Prof Guy-Bart Stan (see Section *Lecture Notes* on [Guy-Bart Stan webpage](#) for full information about the first half of the course) and Dr Tom Ouldridge (teaching the second half of the course). This course is taught during the Autumn and Spring terms (starting the 2nd week of October) and is meant to be an introduction to mathematical concepts and methods useful for modelling and analysing biological systems.
4. Creating a **Facebook group or any other social network group** might be very useful to foster interactions, discussions, and general knowledge sharing.
5. If you want to apply for a **PhD** after your MRes, you need to start thinking about this now (look for funding programs) as the funding opportunities and deadlines are all coming up in the Autumn term. Also, start looking at the web pages and papers of people you may want to do your project with or do a PhD with from the very first week so that you have a good idea of what people you may work with want to get done in their groups.
6. **Enjoy the course and your project!** It will be super exciting and fun if you proactively engage in your learning and research project.

Prof Guy-Bart Stan

Head of the [Control Engineering Synthetic Biology Group](#)