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**EASTBIO Foundation Masterclasses 2022-2023**

**Primer for Synthetic Biology**

**Masterclass lead**: [**Dr Giovanni Stracquadanio**](https://www.ed.ac.uk/profile/dr-giovanni-stracquadanio) (Co-director of the Edinburgh Genome Foundry School of Biological Sciences, University of Edinburgh); **Dr Rennos Fragkoudis** (University of Edinburgh) & **Dr Peter Vegh** (University of Edinburgh)

**Date**: **Monday** **5 June 2023, 11:00-16:30**

**The training will be virtual**: The online link to be send directly to registered students

**Workshop description & level:**

The workshop will give an overview of synthetic biology techniques and applications, ranging from the construction of biological digital circuits to the assembly of synthetic chromosomes, and how these techniques can be scaled up using advanced automated experimental platforms. The primer will be complemented by a short workshop on DNA assembly methods, such as Golden-Gate, Gibson and MoCLO, and hands on activities on designing genes using the software platform developed at the Edinburgh Genome Foundry. Students are required basic understanding of biology and basic molecular biology experiments (e.g. cloning, transformation).

**Learning outcomes:**

By the end of this training, the students will be expected to:

* Understanding the most common DNA assembly methods;
* Manipulate genes sequences to optimise heterologous gene expression;
* Identify opportunities to automate experimental protocols.

**Schedule:**

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| 10:50 | *Informal welcome with introductions* |
| 11:00-12:00 | Synthetic biology: Engineering biological systems from genes to genomes.  Dr Giovanni Stracquadanio |
| 12:00-13:00 | Scaling up synthetic biology: Lab automation for engineering biological systems at scale  Dr Rennos Fragkoudis |
| 13:00 | *Screen break* |
| 13:30-14:45 | ZenithAI: (will not be recorded) |
| 14:45 | *Screen break* |
| 15:00-16:30 | Computer-Aided Bioengineering: Designing biology on a computer  Dr Peter Vegh |
| 16:30 | *Masterclass close* |

Training can be recorded and link to be circulated after student request.

**Requirements**: The workshop will require a laptop with internet access and a modern browser (e.g. Chrome, Safari or Edge).

Students are encouraged to read the following papers before the course:

* Ostrov, Nili, et al. "Technological challenges and milestones for writing genomes." Science 366.6463 (2019): 310-312.
* Tamsir, Alvin, Jeffrey J. Tabor, and Christopher A. Voigt. "Robust multicellular computing using genetically encoded NOR gates and chemical ‘wires’." *Nature* 469.7329 (2011): 212-215.
* Richardson, Sarah M., et al. "Design of a synthetic yeast genome." Science 355.6329 (2017): 1040-1044.
* Nielsen, Alec AK, et al. "Genetic circuit design automation." *Science* 352.6281 (2016).

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

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