

BIO-805

**Summer school on Synthetic biology**

Radenovic Aleksandra, Various lecturers (see below)

Cursus	Sem.	Type
Biotechnology and Bioengineering		Opt.

Language of teaching	English
Credits	2
Session	
Exam	Oral presentation
Workload	60h
<b>Hours</b>	<b>28</b>
Courses	28
<b>Number of positions</b>	

**Frequency**

Only this year

**Remark**September 20, 2021 - October 4, 2021 <https://www.mpg-epfl.mpg.de/4852949>**Summary**

Participants will be introduced to experimental methods and the underlying principles in lectures by scientists who are actively involved in the development of synthetic cells and the related biomedical applications.

**Content**

Synthetic biology is a modern interdisciplinary branch at the interface of life and natural science. Synthetic biology combines disciplines such as physics, chemistry, material science and biology in order to construct life-like materials such as a living cell or organelles by bottom-up reconstitution of cellular phenomena in vitro. Synthetic cells have the potential to be implemented in various biomedical applications such as tailored drug delivery systems, or can be used as a replacement for natural missfunction cells. Moreover, working towards building a synthetic cell may provide new insights into the mechanisms governing life.

In biological research a bio-relevant matter is observed and examined as it normally appears in nature. Therefore, this research generally suffers from the fact that the systems to be technologically explored, such as tissues or cells exhibit an enormous complexity. In an attempt to overcome this complexity, synthetic biology thrives not only to observe the biological matter but also to generate it by means of man-made devices that can be easily controlled to allow a bottom-up assembly. The aim of synthetic biology is to contribute synergistically to the traditional biological research by development of bio-inspired model systems, which could serve as platforms for assembling of specific sets of minimal bioactive components and testing their functional role in initiating a signaling response. In lectures, the Summerschool will address the scientific aspects of bottom-up synthetic biology in the following fields: methodologies to create synthetic cells; synthetic and natural membranes; bio inspired molecular machines and DNA nanotechnology; minimal cytoskeleton; biomedical applications. Participants will be introduced to experimental methods and the underlying principles in lectures by scientists who are actively involved in the development of synthetic cells and the related biomedical applications.

Major topics of the course:

Methodologies to create and analyze synthetic cells

Synthetic and natural membranes

Bio-inspired molecular machines and DNA nanotechnology

The minimal cytoskeleton

Biomedical application

## Resources

### Websites

- <https://www.mpg-epfl.mpg.de/4852949>