

## Biotechnologies – modern day life changers

**Start date** 31 May 2019 **End date** 31 May 2019

**Venue** Madingley Hall  
Madingley Cambridge  
CB23 8AQ

**Tutor** Dr Donata Iandolo **Course code** 1819NDX072  
Dr Céline Labouesse  
Dr Charlie Morgan  
Dr Nikki Weckman

**Director of ISP and LL** Sarah Ormrod

**For further information on this course, please contact the Lifelong Learning team** Zara Kuckelhaus, Fleur Kerrecoe  
[shortcourses@ice.cam.ac.uk](mailto:shortcourses@ice.cam.ac.uk) or 01223 764637

**To book** See: [www.ice.cam.ac.uk](http://www.ice.cam.ac.uk) or telephone 01223 746262

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### Tutor biography

**Dr Donata Iandolo** is a Marie Skłodowska-Curie fellow at the Department of Chemical Engineering and Biotechnology of the University of Cambridge since November 2017. She holds a PhD in Industrial Biotechnologies from the University of Naples (Italy). She is currently investigating the use of electrical stimulation to direct stem cells differentiation for bone regeneration. Before joining her current group, she has been working in Sweden, Singapore and France.

**Dr Céline Labouesse:** is a postdoctoral researcher at the Stem Cell Institute in Cambridge, and a Research Associate at Hughes Hall. She has studied both physics and biology, before focusing specifically on cell mechanics (how cells respond to physical and mechanical signals). She is now working on how mechanical cues can impact stem cell fate in embryonic stem cells. Prior to her position in Cambridge, she studied in France and Switzerland, where she completed her Ph.D. in Physics at EPF Lausanne.

**Dr Charlie Morgan** is chemical biologist at the Medical Research Council Laboratory of Molecular Biology and research associate at Darwin College, Cambridge. He is developing innovative chemical genetic tools to revolutionize cell biology research and drug discovery. Prior to arriving in Cambridge, he completed his PhD in San Francisco, CA USA and a science education policy fellowship at the US National Academies of Sciences, Engineering, and Medicine in Washington DC.

**Dr Nicole Weckman** researches biosensors at the University of Cambridge, particularly focused on the development of diagnostic devices. She is currently a postdoctoral researcher in the Physics Department, having recently completed her PhD in Engineering also at the University of Cambridge. She has been a member of Trinity College since moving to the UK from her native Canada in 2013. She has previously studied engineering at both McGill University and the University of Waterloo, Canada.

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## Course programme

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| 09:30         | Terrace bar open for pre-course tea/coffee   |
| 10:00 – 11:15 | <b>Personalised Big Data: wearable biosensors to genetic testing</b>                                       |
| 11:15         | Coffee   |
| 11:45 – 13:00 | <b>How are implants transforming our bodies: science, benefits, risks</b>                                  |
| 13:00         | Lunch  |
| 14:00 – 15:15 | <b>How is DNA manipulation impacting You: genetic engineering, plants to humans</b>                        |
| 15:15         | Tea  |
| 15:45 – 17:00 | <b>Biotechnologies driving precision medicine: test-driving personalised therapies on miniature organs</b> |
| 17:00         | Day-school ends  |

## **Course syllabus**

### **Aims:**

1. To introduce students to commonly used biotechnology devices and techniques,
2. To provide basic scientific background to the biotechnologies discussed,
3. To explore the implications on society of the increasing use of various biotechnologies,
4. To present state of the art emerging biotechnologies currently researched at Cambridge.

### **Content:**

Are you curious about how biotechnologies are transforming your life? Do you want to learn how sensors, implants, or genetic sensors work? Have you ever thought about how these tools are redefining our societies? This course is made for you! Together, we will explore how and why technology can improve and transform areas such as healthcare, agriculture & nutrition. We will help explain the underlying scientific principles behind biotechnologies currently in the market and in the news. We will give you an inside view from our Cambridge labs on emerging biotechnologies that may disrupt our day to day living. You will have a chance to drive the discussion on the risks and benefits of each new technology. The course is aimed at a broad audience wishing to engage with and discuss the scientific and societal challenges of the increased use of biotechnology. No prior scientific knowledge is required, only a curious and open mind.

### **Presentation of the course:**

We will combine short lectures with group discussions and activities. Examples of prototype devices will be on display. No special equipment is required for the course and handouts will be provided.

### **As a result of the course, within the constraints of the time available, students should be able to:**

1. Recognize commonly used biotechnologies and their applications and identify their mode of action
2. Explain the core scientific concepts underpinning the biotechnologies covered
3. Critically assess potential risks and benefits associated with increased adoption of various biotechnologies
4. Identify and describe examples of emerging biotechnologies currently being researched at the University of Cambridge

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## Reading and resources list

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Listed below are texts that might be of interest should you wish to supplement your learning on the course. Any essential reading is marked with an asterisk \*

| Author | Title | Publisher and date |
|--------|-------|--------------------|
|--------|-------|--------------------|

### Newspaper articles:

<https://www.theguardian.com/artanddesign/2015/jun/22/the-end-of-animal-testing-human-organs-on-chips-win-design-of-the-year>

### Scientific journals:

Diamandis et al. Personalized Medicine: Marking a New Epoch in Cancer Patient Management. Mol Cancer Res; 8(9), 2010;  
Personalized medicine could transform healthcare (Review)  
Mathur, S. and Sutton, J., Biomed. Reports 7: 3-5, 2017;  
Vogelstein, B. et al. Personalized Medicine Part 1: Evolution and Development into Theranostics. P&T, 35 (10), 2010

### Videos:

[https://www.nature.com/collections/txhdfslxzh/videos?WT.mc\\_id=FBK\\_NMETH\\_1017\\_CRISPRAnimation](https://www.nature.com/collections/txhdfslxzh/videos?WT.mc_id=FBK_NMETH_1017_CRISPRAnimation)

### Website addresses

<https://www.technologyreview.com/collection/personalized-medicine/>

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## Additional information

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### Venue

Details of how to find Madingley Hall can be found on our website:  
<http://www.ice.cam.ac.uk/who-we-are/how-to-find-the-institute>

### Refreshments

Tea and coffee and lunch will be provided. If you have any specific dietary requirements or allergies and have not already advised us, please inform our Admissions Team on [ice.admissions@ice.cam.ac.uk](mailto:ice.admissions@ice.cam.ac.uk) or +44 (0)1223 746262.

**Note** Students of the Institute of Continuing Education are entitled to 20% discount on books published by Cambridge University Press (CUP) which are purchased at the Press bookshop, 1 Trinity Street, Cambridge (Mon-Sat 9am – 5:30pm, Sun 11am – 5pm). A letter or email confirming acceptance on to a current Institute course should be taken as evidence of enrolment.

*Information correct as of:* 29 April 2019