imec academy

LAB ON CHIP AND SENSOR TECHNOLOGIES

📅 22-24 January 2018

REQUIRED BACKGROUND KNOWLEDGE

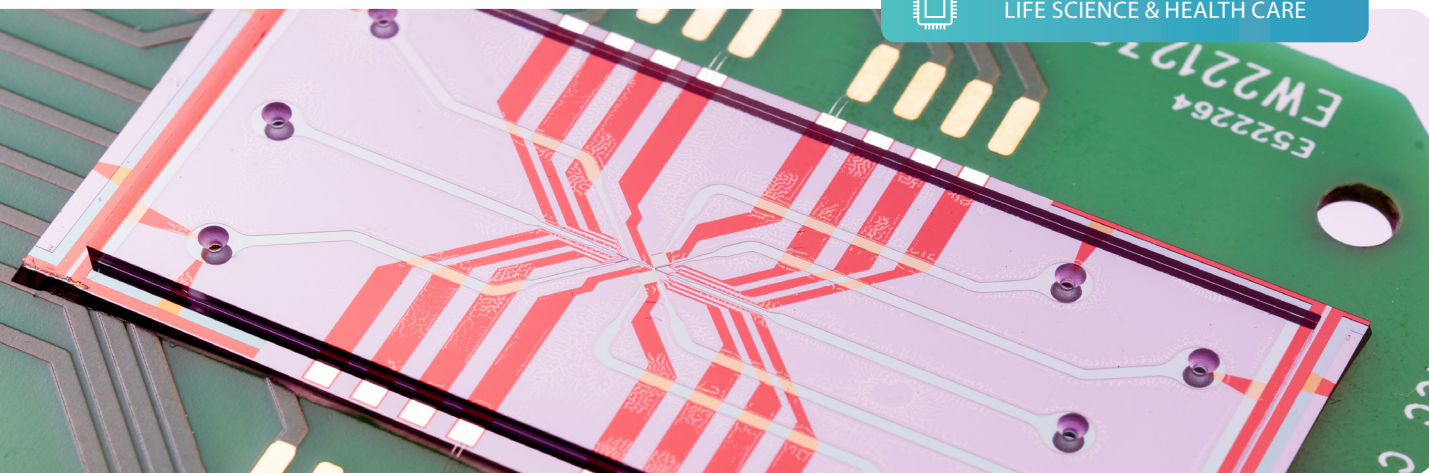Basic (scientific) background in technology, chemistry or biology

ABOUT THE COURSE

The potential of biosensors as a point-of-care diagnostic device or as a life science research tool is tremendous. Numerous initiatives are undertaken worldwide by diagnostic companies and academic institutes to develop affordable, sensitive, specific, user-friendly, rapid and robust, equipment-free and delivered tools. This course reviews several innovative bio sensing concepts and tools which are already commercially available, still on the path to the market or still being developed in an academic environment. It differentiates between diagnostic devices which aim at measuring one or more disease biomarkers in a medical or food context, on the one hand, and life science research tools which aim at providing analytical devices to researchers for testing a life science research hypothesis, on the other hand. Although both types of devices have a completely different purpose and application, many of the building blocks are very similar. Furthermore, although much progress has been made in this multidisciplinary field, there are still technological challenges that need to be tackled.

COURSE OBJECTIVES

• To introduce concepts of bio-sensing and biosensor technology, bio-electronics and bio-nanotechnology in general
• To review different types of bio-assay development
• To review different signal transduction methods
• To review different system integration concepts
• To elaborate on different biosensor principles for applications in medical, food, environmental, and veterinary applications
• To learn to understand and critically evaluate "bio-sensing literature"
• To conceptually design a biosensor for an application

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WHY PARTICIPATE

In this course, the participant learns the basic principles of biosensors, bio-analytical systems, bio chips and lab-on-a-chips with a special emphasis on different transducer technologies, bio recognition layers, bio molecular detection assays and the coupling of the bio recognition elements on the transducer system to obtain a functional bio-analytical device for food, environmental and medical diagnostics. The participant gets an introduction to the design and fabrication of total micro-analysis systems (µTAS), biological micro-electro-mechanical systems (BioMEMS), and lab-on-a-chips (LOC) with a special emphasis on fluid manipulation (digital versus continuous, pressure driven versus electrokinetically), integration of detection principles and integration of bio molecular assays on the chip.

WHO SHOULD ATTEND

Professionals and PhD students in engineering, biotechnology, pharma and health-care who want to understand the technology and its applications.

LECTURING TEAM

Jeroen Lammertyn obtained a Master of Science degree and a PhD. in Bioscience Engineering from the KU Leuven. As an FWO postdoctoral fellow he spent one year as a research associate at the Pennsylvania State University, USA in the research group of Prof. Irudayaraj. Since 2005 he is appointed as Professor in the division MeBioS of the Biosystems department at the KU Leuven. Jeroen Lammertyn is head of the MeBioS-Biosensor group. Its fundamental research activities focus on the development of novel bio-molecular detection concepts and miniaturized analysis systems. The applications span a broad range of sectors including food and medical diagnostics. Jeroen Lammertyn teaches several courses in the Bachelor and Master programs of Bioscience Engineering and the interfacultary Master in Nanoscience and Nanotechnology. He is author or co-author of over 200 peer reviewed research papers and over 100 conference papers, and acts as reviewer for many international peer reviewed journals. He is Technical Program Committee member of MEMS, MicroTAS and Transducers. During his career, Jeroen Lammertyn was a laureate of >10 awards. Recently he was awarded the BiR&D prize (20000 euro) for the most original multidisciplinary doctoral research project with a high potential for industrial valorisation. In 2016 he founded a spin-off in medical diagnostics: Fox Diagnostics.

PROGRAM OVERVIEW

LAB ON CHIP
AND SENSOR TECHNOLOGIES

📅 MON 22.01.18

- o   Introduction to sensors and biosensors
- o   Enzymatic recognition elements
- o   Antibodies as biorecognition elements
- o   Nucleic acid based recognition elements

📅 TUE 23.01.18

- o   Synthetic and cell based receptors
- o   Immobilization of biological recognition elements
- o   Electrochemical transducers
- o   Optical transducers
- o   Mass sensitive transducers

📅 WED 24.01.18

- o   PhD students from imec life science R&D present their research
- o   Continuous microfluidics
- o   Digital and droplet based microfluidics
- o   Advanced bio-assay development
- o   Commercial biosensors and trends

Prices

- •   Price: 2100 EUR (30 % discount for local industry)
- •   Local academia: free

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