

MEMS and MICROFLUIDICS

**A Three-Day Introductory Course
16-18 February, 2010**

**Lancaster University,
Centre for Microsystems Engineering**

Overview

The advancing fields of Micro-fluidics and Micro-Electromechanical-Systems (MEMS) are revolutionising our ability to rapidly analyse chemical and biological specimens in small, inexpensive and portable devices that will make a significant impact in the fields of healthcare, the environment and security. The three-day course on MEMS and MICROFLUIDICS provides an introduction to the principles on which these devices are based and the technologies that come together in their design and manufacture. Participants of the course will also experience a number of hands-on experiments that demonstrate some of the basic processes that take place in a micro-fluidic device.

Course Objectives

Aimed at engineers, biologists and chemists, the course will provide an introduction to MEMS and Micro-Fluidics in the context of the imminent expansion of System-on-Chip and System-in-Package technologies which enable the creation of miniature devices that integrate transducers electronic signal processing. The expected outcomes of participation on the course are the following:

- An understanding of the technologies and assembly solutions needed for specific classes of functions.
- An understanding of the underpinning engineering science associated with micro-fluidics
- An understanding of the structure of a range of sensors and actuators used in Bio-MEMS and fluidic systems.
- The ability to use hand calculation and computer based simulation to design a range of micro structures and fluidic functions.
- The ability to interpret material properties, and to understand the impact of these properties on system performance.

Course Plan

Each day has a theme and consists of a number of lectures together with a lab session as shown below. The lectures cover a wide range of topics from basic micro-fluidic processes to design and integration, through to the application of devices to solve real-world problems.

Day 1: Micro-fluidic Processes	Introduction and course outline	Intro to MEMES and Micro-fluidics	Basic Micro-fluidic Processes and Theory	Lab Introduction	Lab: Micro-fluidic Mixing
Day 2: Integration Technologies	Sensors and Actuators	Manufacturing Processes	Packaging and Integration	LabView based systems	Lab: Micro-fluidic Separation
Day 3: Design and Application	Modelling and Design		Applications for MEMS/ microfluidics	Applications for MEMS/ microfluidics	Lab: Droplet generation

Lab Sessions

The lab sessions provide a hands-on demonstration of three basic micro-fluidic processes; mixing, separation and droplet generation. The micro-fluidic devices used for these experiments are produced by Epigem, a leader in polymer based micro-engineering, and allow participants to observe the processes and interactions as they take place using a Labview™ based PC control system. An example of a 'mixing' device is shown in the picture below.



An Epigem mixing chip

Location

The campus of Lancaster University is located three miles south of the city of Lancaster, with easy access by road (M6 junction 33) and main line rail. It's proximity to the Lake District and Yorkshire Dales makes Lancaster an ideal place to visit. The city has a rich cultural heritage and has much to offer from castles and museums, to theatres, pubs and fine eateries.



Who should attend this course?

This course is ideal for post-graduate students who are starting research work in the Micro-fluidic area, as well as engineers, biologists and chemists who have a need for a practical introduction to the topic. Attendees on the course should hold a university degree or equivalent in a biology, chemistry, bio-chemistry or electronics related degree, and an understanding of basic physics and electronics at a high school level. No background understanding of MEMS or Micro-fluidics is necessary, nor are attendees expected to be accomplished engineers or bio-chemists.

Fees

A small fee of £50 is required to confirm a place on the course and to cover administrative costs. Places are limited to a maximum of twenty participants.

Contact details

For further information on course details and content, please contact Dr. Nick Burd on 01524 593014 or email: n.burd@lancaster.ac.uk.

To reserve a place on the course and to receive information on accommodation options, please contact Claire Duff on 01524 593053 or email c.duff@lancaster.ac.uk.