

Summer Course

on Environmental Life Sciences Engineering

9 – 22 July, 2011

Offered by SCELSE (Singapore Centre on Environmental Life Sciences Engineering)



An intensive and highly interactive course for selected group of graduate and postgraduate researchers. The course is designed to bridge environmental engineering and contemporary life sciences in the context of microbial biofilm-driven processes.

About the Course:

Our understanding of the microbial world is undergoing multiple paradigm shifts. Microbes are no longer viewed as free living, single-celled organisms. Instead there is a growing realisation that they reside in dynamically structured communities of multiple species embedded in a polymeric matrix which we define as biofilms. Their communal activity is substantially different from the summation of the individual member species or variants. Furthermore many of these microorganisms cannot grow independent of their community biofilm, such that classical approaches of pre-culture laboratory studies are limited. Hence, to understand the activity of biofilms, and their member species, we must study the community using a complex system approach.

These paradigm shifts make it necessary for us to revisit applications of microbes in engineering processes, human health and environmental contexts, an endeavor made possible through the concurrent rapid and exciting developments in life sciences, including those of metagenomics, systems biology, high resolution imaging, nanotechnology and single cell microbiology. Using such a platform for exploring the biology of microbial biofilms will allow for the development of new environmental engineering tools for informed manipulation of the biological processes from within, rather than the current use of external control procedures. The latter necessitates the use of large-scale engineering platforms catered to the need for stable bioprocesses with little knowledge of the biology of the microbial biofilms. As we move forward, a new spectrum of graduate level students, investigators and practitioners in environmental engineering with good insights into contemporary life sciences is needed to efficiently allow for environmental sustainability under exponentially increasing environmental stress. These experts will be in a position to safeguard urban as well as environmental sustainability and ensure human well-being in increasingly stress-impacted habitats.

Aims:

This course aims to provide a two-fold exposure to emerging concepts of microbial life and biofilm biology; firstly, to familiarize participants with our current state of knowledge of microbial systems and secondly, to understand the frontiers of life sciences that can be applied to an enhanced understanding of the default mode of microbial life in biofilms and to harness such microbial activities to efficiently recycle natural resources, provide pure water, control health risks and ensure sustainable environment for future generations.

Guest Teachers:

This two-week course brings together world-renowned scientists and engineers including SCELSE scientific leaders, Yehuda Cohen (Israel), Staffan Kjelleberg (Australia), Stefan Wurtz (USA), Stephan Schuster (USA), Michael Givskov (Denmark), Sanjay Swarup (Singapore), Alexander Zehnder (Switzerland), Joan Rose (USA), and guest experts including Gijs Kuenen (the Netherlands), Hans-Curt Fleming (Germany) and Per Nielsen (Denmark). Participants will interact with these experienced mentors in their interdisciplinary approach to understand and harness the biology of biofilms in environmental, health and industrial applications. The course consists of: structured core lectures, topical seminars, guided discussions on specialized topics and case studies, international and regional perspectives as well as an exposure to the progress made by Singapore for its water resources. Learning outcomes involve understanding mechanisms and processes using quantitative approaches. This knowledge will be used to help design experiments that can yield information for developing new technologies or solving problems in the engineered environments.

The course is held in the midst of NTU's rich, green campus. The course format provides ample opportunities for the participants to interact closely with the mentors in small groups and informal settings.

Application Process:

Applicants with strong and demonstrated interest in exploring interdisciplinary approaches to address complex scientific scenarios will be preferred. The course is open for students worldwide currently pursuing graduate programs or those graduated within the last 3 years in engineering or sciences including life sciences, chemical or physical sciences. Applicants from Asia are highly encouraged.

Admission to the course is competitive with restricted number of seats. Successful applicants will receive housing, meals and some allowances. Additional financial support will be provided to partially cover travel. Online applications are to be made through the following website: <http://www.scelse.ntu.edu.sg/PROGRAMMES/Pages/SummerCourse.aspx>

Application deadline: April 15, 2011.

www.scelse.ntu.edu.sg

Please visit the SCELSE website for more information.