

**The Chinese University of Hong Kong**  
**Faculty of Engineering & Faculty of Science**

Summer Courses 2022  
Course Outline

***STEM1050 Micro-and Nano-technology for Biosensing***  
**微納生物傳感技術**

**Introduction:**

Micro- and nano-technology allows the manipulation of matter on a near-atomic scale (~1 billionth of a meter!) to produce new structures, materials and devices. At the micro- and nano-scale, materials begin to exhibit unique properties that affect physical, chemical, and biological behaviors, which may provide unprecedented opportunities for frontier medical research to detect biomolecules effectively and to study the properties of biomolecules in details.

微納技術可在近原子尺度（約十億分之一米）上操縱物質，以創造新的結構、材料和設備。不同材料在微米和納米尺度上會展現出影響其物理、化學和生物行為的獨特性質，這可以為前沿醫學深入研究生物分子性質以及實現有效檢測提供前所未有的機會。

**Medium of Instruction:** English supplemented with Cantonese

**Organising Unit:** Faculty of Engineering & Faculty of Science

**Teacher:**

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**Course content:**

15 August 2022 (Monday)  9:30 am – 12:30 pm 1:30 pm – 4:30 pm	<b><u>Lecture:</u></b> <ul style="list-style-type: none"><li>• Molecular basis of life: Macromolecules and molecular interactions</li></ul> <b><u>Lab:</u></b> <ul style="list-style-type: none"><li>• From gene to protein; DNA and protein structures in 3D (lecture and computer lab)</li></ul>
16 August 2022 (Tuesday)  9:30 am – 12:30 pm 1:30 pm – 4:30 pm	<b><u>Lecture:</u></b> <ul style="list-style-type: none"><li>• Recombinant technology: Gene and protein engineering</li></ul> <b><u>Lab:</u></b> <ul style="list-style-type: none"><li>• Determination of gene expression by real time PCR</li></ul>
17 August 2022 (Wednesday)  9:30 am – 12:30 pm 1:30 pm – 4:30 pm	<b><u>Lecture:</u></b> <ul style="list-style-type: none"><li>• The immune responses: Antibody-mediated immunity and cell-mediated immunity</li></ul> <b><u>Lab:</u></b> <ul style="list-style-type: none"><li>• Analyzing protein by ELISA</li></ul>
18 August 2022 (Thursday)  9:30 am – 12:30 pm 1:30 pm – 4:30 pm	<b><u>Lecture:</u></b> <ul style="list-style-type: none"><li>• The role of biotechnology in COVID-19 pandemic</li></ul> <b><u>Lecture:</u></b> <ul style="list-style-type: none"><li>• Introduction of Nanobiotechnology</li></ul>
19 August 2022 (Friday)  9:30 am – 12:30 pm 1:30 pm – 4:30 pm	<b><u>Lecture:</u></b> <ul style="list-style-type: none"><li>• Fabrication and Characterization of Nanomaterials and Devices</li></ul> <b><u>Lab:</u></b> <ul style="list-style-type: none"><li>• Wearable Ion-Selective Sensors</li></ul>
22 August 2022 (Monday)  9:30 am – 12:30 pm 1:30 pm – 4:30 pm	<b><u>Lecture:</u></b> <ul style="list-style-type: none"><li>• Biosensing and Bioelectronics (applications of bioengineered materials and bioelectronics)</li></ul> <b><u>Lecture:</u></b> <ul style="list-style-type: none"><li>• Introduction of microfluidic chip for detecting the bio-molecular (protein/DNA/RNA)</li></ul>
23 August 2022 (Tuesday)  9:30 am – 12:30 pm 1:30 pm – 4:30 pm	<b><u>Lecture:</u></b> <ul style="list-style-type: none"><li>• The principle of point-of-Care Diagnostics (Covid19 fast diagnostics) &amp; Fabrication of Microfluidic Chips</li></ul> <b><u>Lab:</u></b> <ul style="list-style-type: none"><li>• Covid19 antibody kit test/Pregnancy Kit Test</li></ul>
24 August 2022 * (Wednesday)  9:30 am – 12:30 pm 1:30 pm – 4:30 pm	Make-up Class

<b>Duration</b>	7 whole day sessions (total 42 contact hours)
<b>Date</b>	15-19, 22-23 August 2022 24 August 2022* (make-up class)
<b>Time</b>	9:30 am – 12:30 pm & 1:30 pm – 4:30 pm
<b>Teaching Mode<sup>#</sup></b>	Face to Face (The Chinese University of Hong Kong)
<b>Enrollment</b>	30
<b>Expected applicants</b>	Students who are studying S4-S6 or equivalent who must have taken at least Biology and Physics and preferably the following science courses, including Chemistry, Combined Science, Information and Communication Technology, Design and Applied Technology, Mathematics Extended Module 1 or 2
<b>Tuition Fee</b>	HKD 3,500.00 Students who attend all the sessions will have \$500 scholarship
<b>Credit</b>	2 University Unit Certificate will be issued to students who fulfill the course requirement, i.e. pass in assessment and attain 75% attendance

\* This date is reserved for make-up classes in case there is any cancellation of classes due to unexpected circumstances.

# This course will be offered on CUHK campus in face-to-face mode only. It may be cancelled in accordance with the pandemic development and the policy of the university.