Gifted Education Fund: Off-school Advanced Learning Programmes

Programme No. 2021-06 (For secondary students)

Title of Programme	**You Light up My Life - Visualisation and Automation of Colorimetric Data Analysis**
Programme Provider	Department of Biomedical Engineering, City University of Hong Kong
Theme	STEM-related Mentorship Programme
Maximum No. of Participants and Class Level in the 2021/22 School Year	20 students (Secondary 2-5)
Pre-requisite	No special background knowledge or skills are required.
Programme Delivery Period	From July 2022 to Sept 2023 (15 months) (tentative)
Medium of Instruction	Course Material: English Class teaching/ Discussion: Class teaching - English, workshops - English supplemented with Cantonese, if necessary
Objectives	• To engage gifted students in authentic biomedical research and equip them with knowledge and skills of experimental design, implementation and characterisation of fluorescence biosensors via a problem-based learning approach; • To enhance the ability of students in integration of knowledge and skills across disciplines to solve advanced scientific and engineering problems with innovation and creativity; and • To nurture positive values and attitudes among students such as a resilient mindset against adversities, perseverance in pursuing one's goals, willingness to contribute and help others, etc.
Programme Outline*	This programme provides a learning opportunity for gifted students to participate in authentic biomedical research under supervision and mentorship of academics specialised in biomedical engineering. Besides strengthening knowledge and skills in experimental design, implementation and characterisation of biosensors through problem-based learning, the programme will also cultivate students' positive values and attitudes. The programme consists of six phases. Phase I: Basic Micro/ Nanotechnology Principles (12 hours in total) • Students will attend lectures and acquire knowledge of basic micro/ nanotechnology principles, and learn to use device design software such as AutoCAD and simulation software such as MATLAB to illustrate and simulate the devices used to operate the biosensors.

	Phase II: Independent Projects (3 months in total) • Students will start to work on independent projects based on the biosensor selected and their understanding of micro/ nanotechnology principles under mentorship and support. Phase III: Device Fabrication and Experiments (2 months in total) • Students will attend workshops on device fabrication and conduct experiments in the biomedical engineering laboratories. Relevant experiments will include photolithography, soft lithography and device assembly. • Students will need to record their findings and results in written reports. Phase IV: Biosensor Validation and Experiments (5 months in total) • Students will attend workshops on biosensor validation and conduct experiments that include imaging, cell culture and microscopy in the biomedical engineering laboratories. Phase V: Automated Data Analysis (4 months in total) • Student will attend workshops on automated data analysis and conduct biostatistical analysis which involves image processing and use of MATLAB. Phase VI: Showcase Event (2 to 3 days) • Students will submit final reports and the biomedical devices designed by the end of the programme. • Students will showcase their devices and research findings in a conference organised by a collaborative institution. Parents and teachers will be invited to attend the event. * In view of the latest development of the COVID-19 pandemic, the programme provider may need to modify the learning and teaching activities as a contingency.
Application Method	Application form can be downloaded from the following webpage: https://www.edb.gov.hk/en/curriculum-development/curriculum-area/gifted/ge_fund/gef/programme/current.html Please complete the application form and send it by post on or before 16 May 2022 to the following address: Department of Biomedical Engineering City University of Hong Kong Tat Chee Avenue Kowloon Tong (Attn: Dr KHOO Bee Luan)

Documents to be Submitted along with the Application	• Evidence of Other Learning Experiences (if any)
Enquiry	Dr KHOO Bee Luan (Department of Biomedical Engineering, City University of Hong Kong) Tel No.: 3442 9423 Email: blkhoo@cityu.edu.hk
Date of Announcement of Result	By mid June 2022 (tentative)