Office of Education Development and Gateway Education

香港城市大學
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Discovery-based learning in life sciences using molecular biology techniques and super-resolution confocal imaging system

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Abstract No.: 6000680

Abstract:

Cell is the smallest and basic unit of life, and all living things are composed of cells. To enhance the learning experience of students in life sciences that related to biomedical sciences, we propose to examine major cellular events such as cell division, cell survival and cell structure using molecular biology and super-resolution confocal imaging system. The new Carl Zeiss LSM 880 with Airyscan at the Department of Biomedical Sciences (BMS) is a powerful imaging system for life sciences research. CityU was the first one in Asia to obtain this high-end imaging system, which can resolve structures as small as 120nm including most of the organelles inside the cells (i.e. mitochondria) and viruses. Current proposal includes two phases (I and II). Phase I will involve students to learn and perform major laboratory modules in life sciences including (1) Cell viability and proliferation assay, which aims to develop assay to measure cell proliferation and survival using a human cancer cell line. (2) Cell structure and morphology with the aid of super-resolution confocal imaging system to examine cytoskeleton of a mouse embryonic fibroblast cells by immunostaining technique. (3) Biochemical assay to understand enzyme kinetics by spectrophotometer. (4) Protein identification, purification and expression assay to learn how pharmaceutical company produces enzymes and biomedical products in high purity. After the completion of all laboratory modules in Phase I, Phase II will involve students in the application of these experimental modules in group research projects in the field of life sciences. For instance, as part of the challenge the students are expected to design experiments to examine side effect of drugs on cell survival, cell morphology and protein expression using both molecular biology techniques and super-resolution confocal imaging system. My goal is to design experimental modules which match student's expectations and to create an interactive and discovery-based learning environment in the field of life sciences. Current proposal not only aims to equip students with the skillsets needed to transition into successful careers in life science, but also to develop critical thinking that required in all disciplines.