

THE CHINESE UNIVERSITY OF HONG KONG

Micro-Module Courseware Development Grant

Scheme 1: Basic Scheme

Interim Report (2016-17)

Report due 31 October 2017.

Please return by email to mmcd@cuhk.edu.hk

PART I

Project title: Using Flipped Classroom to Enhance Interactive Teaching and Learning in Advanced Topics in Biological Electron Microscopy and Live Cell Imaging

Principal supervisor: Prof. Jiang Liwen

Department / Unit: School of Life Sciences

Project duration: From May 2017 to April 2018

Date report submitted: October 31, 2017

1. Project objectives

Is the project on track to meet its objectives?

Have the objectives been changed as a result of the experience of working on your MMCDG project?

The original project objective is to develop micro-modules on biological electron microscopy and live cell imaging to facilitate students' out-of-class learning, as well as to reinforce students' knowledge and interest in the topics.

The project follows its original objectives. 4 Micro-modules (a total of 12 videos) regarding theories and proper procedures of operating the biological electron microscopy and live cell imaging systems have been produced by Prof. Jiang and Prof. Kang successfully to meet the objectives. The micro-modules were the same as the original plan and the videos have been uploaded to website for students' self-learning, which have been put into use for teaching the course LSCI5012 in September 2017 for the first time.

2. Progress on process, outcomes or deliverables

What have been accomplished so far?

Have any obstacles been encountered and what are the remaining tasks to be finished?

Is the project still on time for completion (which includes preparation of the final report) on or before the grant expiry date?

Provide a listing of project outputs to date.

During the first half of the project period, a list of videos relating theories and proper procedures of operating the biological electron microscopy and live cell imaging were produced by Prof. Jiang and Prof. Kang.

In the project, we aim to produce two sets of micro-modules. Set A focus on the theories of Electron Microscopy and Live Cell Imaging, with examples of research results derived from using the Microscopy techniques. Set B displays the sample preparation and proper procedures for operating the Advanced 3D Tomography TEM and advanced live cell imaging system via video-taking of real-time demonstration of experienced researchers.

The list of micro-module is shown below:

A) Videos explaining theories of advanced microscopy

- A1. Theories of advanced Live Cell Imaging
- A2. Theories of Electron Microscopy

B) Videos showing proper procedures of advanced microscopy

- B1. Confocal microscopy, spinning disk confocal microscopy, image analysis
- B2. High pressure freezing, freeze substitution
- B3. Mounting, trimming, glass knife preparation
- B4. Ultramicrotomy, post-staining
- B5. TEM imaging and image interpretation
- B6. Tomography data collection, tomogram calculation and tomography modeling

In the proposal, we planned to produce Micro-modules A1-2 and B1-2 by October 2017 and completed Micro-modules B3-6 by April 2018. With slight alteration of the original plan, we have completed modules A1 and B1-3 by October 2017. Nonetheless, we will produce the other 4 micro-modules according to the original schedule and expect to complete the project on time. A total of 12 videos have been produced for the four micro-modules and they have been uploaded to the CUHK Blackboard online platform for students taking the course *LSCI5012 Using Flipped Classroom To Enhance Interactive Teaching and Learning in Cell and Molecular Biology* to view before classes.

The micro-modules and the corresponding videos produced in the first half of this project are shown below:

No.	Video Title	Producer
A1: Theories of advanced Live Cell Imaging		
1	Introduction to live cell imaging	Prof. Jiang
2	Confocal microscopy I	Prof. Jiang
3	Confocal microscopy II	Prof. Jiang
4	Spinning disk confocal and super resolution microscopy, imaging analysis	Prof. Jiang
B1: Confocal microscopy, spinning disk confocal microscopy, image analysis		
5	Confocal Laser Scanning Platform Basic Imaging	Prof. Jiang
6	Confocal Laser Scanning FRET and FRAP analysis	Prof. Jiang
7	Spinning Disk Confocal Microscopy for Four-dimensional Imaging	Prof. Jiang
8	Single-Molecule Super-Resolution Imaging – SIM	Prof. Jiang
9	IMARIS Image Visualization and Analysis	Prof. Jiang
B2: High pressure freezing, freeze substitution		
10	High Pressure Freezing	Prof. Kang
B3: Mounting, trimming, glass knife preparation		
11	Mounting and trimming	Prof. Kang
12	Making glass knives	Prof. Kang

The videos are complemented with a set of questions including multiple choice, true or false and short discussion questions. These questions have also been uploaded to the website so that students taking this course can answer the questions after watching the videos but prior to the lectures.

All the completed online videos, quizzes and answers have been uploaded to the CUHK Blackboard online platform. The link is: https://blackboard.cuhk.edu.hk/ultra/courses/_93682_1/cl/outline

3. Evaluation Plan

Have you altered your evaluation plans?

Does your evaluation indicate that you have achieved your objectives?

We planned to perform two surveys in the first and last lesson respectively to identify students' potential learning problems and to determine whether the problems have been solved by our micro-modules. It will also help us to assess the effectiveness of our

micro-modules in achieving the pedagogical goal and to identify areas for further improvement. Academic performance of classes with the micro-modules will also be compared with those of previous classes without.

Our evaluation plans have not been changed which are being carried out during the lectures of *LSCI5012 Using Flipped Classroom To Enhance Interactive Teaching and Learning in Cell and Molecular Biology*.

4. Dissemination Activities (reports, websites, video links, products, etc.)

Provide a listing of dissemination activities to date.

Online videos, quizzes and answers are uploaded to the following website.

https://blackboard.cuhk.edu.hk/ultra/courses/_93682_1/cl/outline