

# THE CHINESE UNIVERSITY OF HONG KONG

## Micro-Module Courseware Development Grant

### Scheme 1: Basic Scheme

#### Interim Report (2015-16)

Report due 30 June 2016.

Please return by email to [mmcd@cuhk.edu.hk](mailto:mmcd@cuhk.edu.hk)

#### PART I

Project title: Courseware for teaching atmosphere, ocean and climate dynamics

Principal supervisor: Prof Francis Tam

Department / Unit: ESSC

Project duration: From January 2016 to December 2016

Date report submitted: June 30, 2016

#### **1. Project objectives**

- To develop a micro module courseware based on geophysical fluid dynamic experiments
- To help students to obtain physical sense of fluid dynamics phenomena relevant to atmosphere and ocean circulations

#### **2. Progress on process, outcomes or deliverables**

So far we have developed 3 micro-modules using the apparatus 'weather in a tank'. Each of these module consists of a 2-minute video demonstrating a particular experiment using the rotating tank, accompanied by a worksheet comprising 4-5 questions for further discussion in class. These 3 modules have been used for illustrating fundamental concepts in large-scale ocean dynamics in ESSC3300 (Ocean and Climate) in the second semester of the 2014-15 school year. In particular, students were asked to watch these video demo (which can be found on the course webpage in the eLearning system) before coming to class. During class, students were shown again exactly the same experimental setup; they were also asked to take simple measurements in order to gain hands-on experience. At the same time, they would also discuss among themselves and were asked to complete a worksheet designed for each module.

It was seen that most students were actively participating in the lab demo (such as taking measurements, or trying to repeat the experiments themselves). Judging from their response and their performance in answering questions in the worksheets, these demos did help most of them to better understand the fundamental physics behind those phenomena.

Overall, these activities helped us to engage students; they were shown the lab demo first then demos of various oceanic circulation phenomena in these short videos, before actually demonstrating the experiments in class (and even let them to try their hands on, if they want). They gained better intuition about rotational fluid dynamics; this is not something easy to achieve from textbooks and through traditional lecturing. By videotaping the experiments, students can also go back and watch them again when needed.

Deliverables: 3 micro-modules entitled “Solid-body rotation”, “Taylor columns” and “Ocean gyres”, each comprising a short video and also an accompanying worksheet for class activities

### **3. Evaluation Plan**

Direct evidence will be collected by evaluating students’ performance in completing tasks outlined in the worksheets for various GFD experiments. In addition, we will conduct student surveys and collect instructors’ own reflection on the use of these micro-modules in learning and teaching atmosphere, ocean and climate dynamics. Students will be asked about how the micro-modules as a whole can increase their level of engagement, help them in understanding course content, conceptualizing phenomena, and to relate to various meteorological and oceanic phenomena. Teachers will reflect on the effectiveness of the modules as tools to assist instructing various atmospheric and oceanic phenomena, the level of interests of and impacts on students.

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

2-minute video: A short video showing one of the modules, as well as the lab demo during class in our teaching lab can be found in

<https://drive.google.com/folderview?id=0B4sXor4rl-QNOEZYaGowc1QtV3M&usp=sharing>