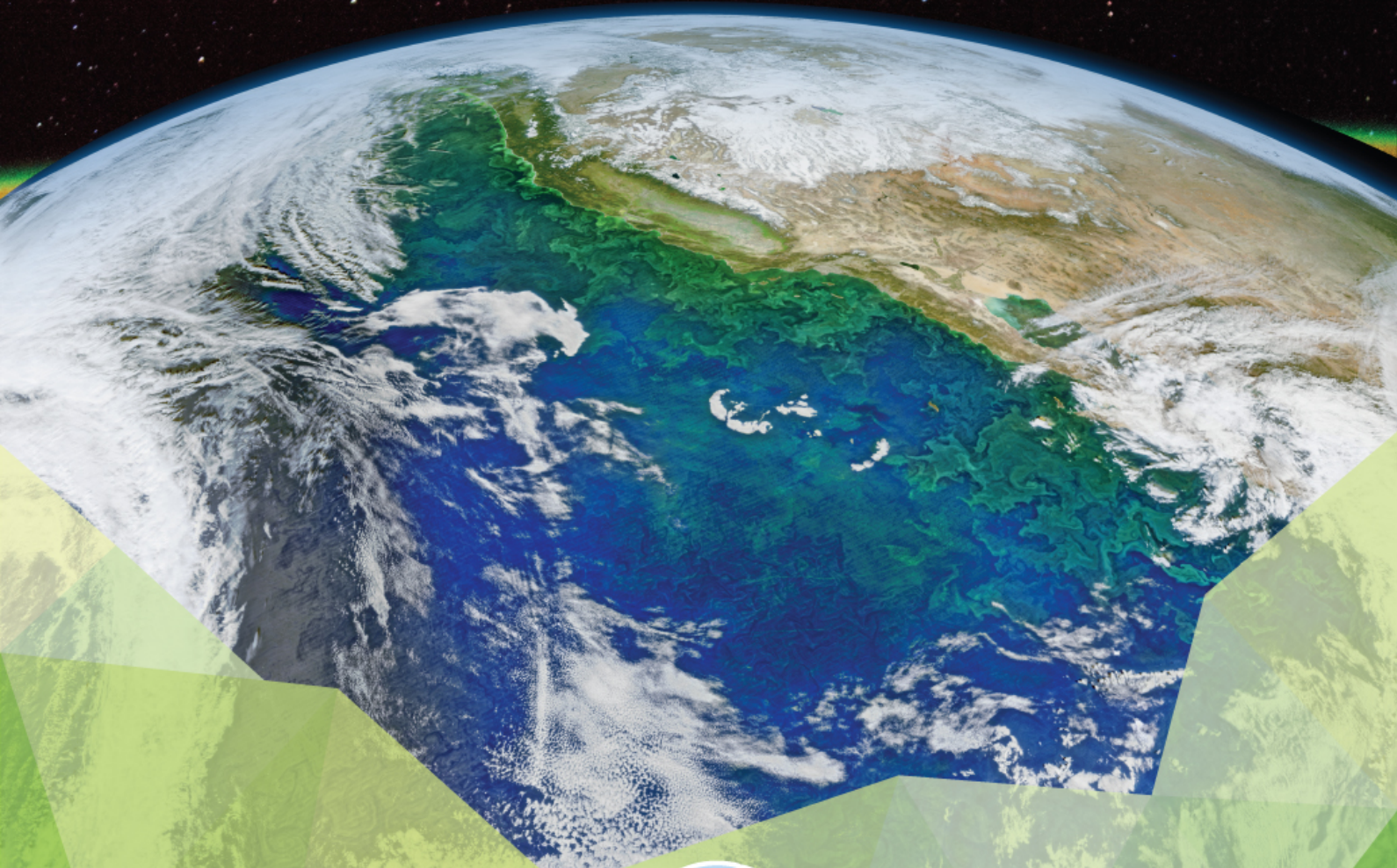




香港中文大學理學院
FACULTY OF SCIENCE
THE CHINESE UNIVERSITY OF HONG KONG



EARTH SYSTEM SCIENCE PROGRAMME

地球系統科學課程

Introduction



Earth System Science (ESSC) studies the dynamics of the Earth as an integrated system that includes the **atmosphere, biosphere, geosphere, hydrosphere** and human activities, as well as their mutual interaction. Studying how our planet Earth works as a system constitutes the intellectual core and knowledge base for probing and solving many critical issues of public concern, such as global climate change, air and water pollution, natural hazards, biodiversity, energy resources, and sustainability. Major advances in our fundamental understanding of these issues have derived from scientific research that integrates traditional disciplines such as geology, meteorology and oceanography. With this in mind, the ESSC curriculum has been developed to educate a new generation of students under this interdisciplinary framework of "Earth System Science". Our programme equips students with the necessary knowledge, analytical and quantitative skills, as well as

research experience to tackle the major challenge of the 21st century, namely, our sustainable existence on this planet via a balanced and rational management of the environment and natural resources.

Our curriculum emphasizes basic sciences of the Earth System. Adoption of a system approach facilitates a fundamental understanding of various components of the Earth System and their complex interactions including the causes, effects and feedbacks within a unified framework. Students have ample opportunities to participate in externally funded research projects related to basic and applied problems in Earth System Science. To enhance students' experience beyond the campus setting, internships and field trips are integral components of the curriculum.

Course Structure

(4-year BSc Programme in Earth System Science)

The ESSC major adopts a three-layered curriculum structure that emphasizes the interdisciplinary nature of the programme. Students are required to complete 72 units of courses as follows:

Year 1-2

Foundation layer: an overview of Earth System Science, basic sciences and computing skills.

- Introductory ESSC 6 units
- Foundation Science 15 units
- Basic Programming 3 units

Year 2-3

Intermediate layer: a group of courses on four focus areas of the Earth System, supplemented by a choice of supporting science courses.

- ESSC 18 units
- One area of supporting science ≥ 8 units
- Other supporting science 3 units

Year 3-4

Top layer: a group of electives, including upper-level Earth System Science and relevant courses from other programmes, plus a required capstone research project.

- Capstone project 6 units
- ESSC elective 3 units
- Other ESSC or supporting science electives 9 units



Admission

JUPAS applicants can become an ESSC student at CUHK through one of the following two paths:

- **Earth System Science (Atmospheric Science/Geophysics)** (JUPAS Code: JS 4633)
- **Science – Broad-based Admission Scheme under the Faculty of Science** (JUPAS Code: JS 4601)

Interested student please visit ESSC website for detailed information of admission requirements and stream declaration.

http://www.cuhk.edu.hk/sci/essc/ug_prg.html

Stream Declaration

The **Atmospheric Science (AS)** and the **Geophysics (GEO)** Streams are two study schemes within ESSC which provide opportunities for more in-depth studies in one of these sub-disciplines. Stream declaration is available to both JS4633 and JS4601 admitted students.

JS4633

- ✓ Compulsory
- ✓ To declare stream in the 1st year of study

JS4601

- ✓ Optional
- ✓ To declare stream in the final year of study



Highlights of ESSC Courses

Introductory Courses

- Exploring the Earth System
- Solid Earth Dynamics



*Tour to Museum of Climate Change

- Climate System Dynamics
- Geoscience Field Study



*Field Trip in Taiwan

- Biosphere, Climate and the Environment
- Environmental Engineering

Intermediate-Level Courses

- Structural Geology
- Physics of the Earth
- Atmospheric Dynamics



*Weather in a Tank for geophysical fluid dynamics (GFD) experiment using a rotating tank



*Visiting Hong Kong Observatory

- Atmospheric Chemistry
- Ocean and Climate
- Hydrogeology
- Ecosystems and Climate
- Global Environmental Change

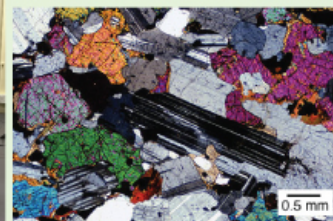
Upper-Level Courses

- Continuum Mechanics
- Geoscience Field Course



*Field trip in Wutai Shan

- Applied Geophysics
- Petrology



*Petrographic Microscope for identifying rocks and minerals in thin sections

- Geomorphology
- Seismology
- Marine Geology and Geophysics
- Land-Atmosphere Interactions
- Tropical Meteorology
- Aerosol Physics and Chemistry
- Air Pollution Science
- Statistical Data Analysis
- Numerical Methods and Modeling
- Remote Sensing — Principles and Applications

FAQs

Q1. What is the difference between ESSC & Geography subject?

As part of the Faculty of Science, ESSC has a strong emphasis on scientific and mathematical knowledge, as well as on quantitative skills.

Q2. What's the difference between broad-based Earth System Science (ESSC) and Earth System Science (Atmospheric Science / Geophysics) (ESSC-ASG JS4633)?

For a student who enters ESSC through JS 4633, it is compulsory for him / her to declare one of the streams. Declaration however is not a must for students who are admitted through JS4601, but they can apply in their final year of attendance to specialize in either the stream of Atmospheric Science or Geophysics and select relevant courses as prescribed in the Study Schemes. Please visit our website and refer to the course list: http://www.cuhk.edu.hk/sci/essc/ug_prg.html

Q3. What's the advantage to be admitted through ESSC-ASG (JS4633)?

If you were to apply for direct entry through JS4633, you can have an early start in taking ESSC introductory courses. This allows you to take full advantage in choosing from a rich collection of intermediate and advanced courses at ESSC. At graduation, you will have a very comprehensive training and will be well prepared for pursuing a career in related fields or postgraduate studies.

JS4633

Earth System Science Programme
(Atmospheric Science/Geophysics)

DSE Subjects

Minimum Scores

| | |
|--|---------|
| English Mathematics Elective Subject 1 | Level 4 |
| Chinese Elective Subject 2 | Level 3 |
| Liberal Studies | Level 2 |

Students can have an early start
in taking ESSC courses!

ESSC Student

JS4601

Science Broad-based
Admission Scheme

Major Declaration

Science students can declare ESSC as a Major at any of the following three time points, provided that they meet the stated requirements.

Time

Requirements

| | |
|-----------------------------|---|
| Beginning of Year 1 (Entry) | Level 5 or above in Biology or Chemistry or Physics or Combined Science |
| End of Year 1 | Grade C+ or above in CHEM1070 or LSCI1002 or MATH1010 or PHYS1111 or PHYS1113 or STAT1011 |
| End of Year 2 | Have taken (but not necessarily passed) (1) ESSC2010, ESSC2020, and (2) Any ONE course from CHEM1070 / LSCI1002 / MATH1010 / PHYS1111 / PHYS1113 / STAT1011 |

Q4. Can a broad-based ESSC major student declare Atmospheric Science / Geophysics stream?

Yes, a broad-based ESSC major student can declare for the stream if he or she meets the requirement as pre-described in the Study Scheme.

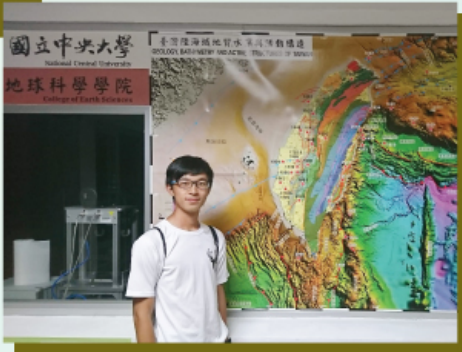
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Phone: (852) 3943 9624
Email: essc@cuhk.edu.hk

Fax: (852) 3942 0970
Website: <http://www.cuhk.edu.hk/sci/essc/>



Student Sharing



ESSC2120 Integrated Geoscience Field Study 2018 Taiwan Field Trip

Jeremy WONG

Contrary to studying in a classroom, the integrated field trip is really a remarkable learning experience on meshing up multidisciplinary knowledge including geology, seismology and others taught in different courses. Throughout the field trip and visits to various institutes, I deeply understood the dynamics of Taiwan with its past tectonic evolution and present evolving structures and earthquake activities. Not only were we guided by experienced teachers from National Central University, but we also gained rewarding friendship with our classmates and teachers after the trip. I bet you will experience the same as I did if you take this course too.

Undergraduate Research Programme

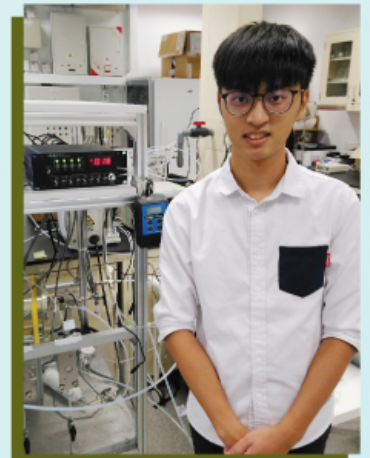
Characterizing the Performance of an Oxidation Flow Reactor for Heterogeneous Oxidation of Laboratory-generated Secondary Organic Aerosols

Student: Orion POON

Supervisor: Prof. CHAN Man Nin

Research is very much like a dream to most of the science students. Luckily, our programme provides us many chances to participate in research. Last summer, I had an opportunity to work in Prof. Chan's laboratory and learnt how to carry out research related to atmospheric science. My summer research project aimed to construct a new experimental setup to investigate how organic compounds in ambient particulate matters chemically transform through heterogeneous oxidation. At the beginning, everything in the laboratory was new to me. Prof. Chan and his graduate students taught me how to operate the instruments and design the experiment setup. Although the tasks were challenging and the difficulties faced were much more than that I initially thought, the sense of satisfaction was incredible when I have finally accomplished the missions.

The undergraduate research programme really helped me to find my interest in research and now I am working as a research assistant in our programme. The experience and skills I learnt from the research greatly enhanced my ability in both academic and social aspects. It was a great and memorable experience in my undergraduate life at CUHK and this experience could definitely benefit my future career!



Placement Programme at the HKO

Leo NG

Working in Hong Kong Observatory (HKO) for a year provides me an opportunity to do research using operational data. Apart from that, the time when Super Typhoon Hato (with typhoon signal No. 10) hit Hong Kong in July was the most memorable moment in the whole year. As a student intern, I was able to observe how HKO staff using professional forecasts and nowcast tools on Hato. During the internship period, I was responsible for developing a simplified meso-scale atmospheric model. This challenging task allowed me to apply what I have learnt in boundary layer meteorology (ESSC 4210). The model needs to be continuously modified to obtain better forecasting performance on different weather elements under the supervision of my mentor. This year's experience raised my interests in scientific researching and further studies after graduation.

Research Opportunities

The ESSC programme hosts a team of dynamic and outstanding faculty members. Each year, the ESSC programme attracts more than 4 million HKD from external funding sources.

ESSC undergraduate students have been actively conducting research projects under close guidance from the faculty members, through which students have received rigorous training and gained valuable research experience.

We have established research collaborations with top universities worldwide, including Caltech, Harvard, MIT, Princeton, Stanford, University of California Berkeley, and many others in Mainland China, Australia, Europe, Japan, Korea, UK, and US. We also host visiting undergraduates from Mainland China, Taiwan, and Japan to conduct summer research.

Career Prospects

Students who graduate with the ESSC degree will be well qualified for postgraduate work in any of the sub-disciplines in Earth and Atmospheric Sciences. The interdisciplinary nature of the ESSC major makes it an excellent preparation for employment in:

- ✓ Education
- ✓ Research including climate modeling, remote sensing, environmental protection, urban development
- ✓ Natural hazard reduction and risk management
- ✓ NGOs, government agencies, insurance companies
- ✓ Weather services
- ✓ Environmental consulting
- ✓ Data analytics
- ✓ Careers that require skills of data mining, IT and GIS applications

Postgraduate Programme

ESSC is offering a graduate programme on Earth and Atmospheric Sciences (EASC) at M.Phil. and Ph.D. levels. EASC is an interdisciplinary graduate programme and provides opportunities to students who are interested in conducting researches on fundamental and applied sciences of the geosphere, atmosphere, hydrosphere, cryosphere, biosphere, and the interactions between them.