OCES 4204 – Coral Reef Ecosystem Science

Provided for reference only, to be delivered as flipped classroom / independent study in

1. Instructors

Prof. Alex S.J. WYATT (AW), Course coordinator
Phone: 3469 2824; Email: wyatt@ust.hk
Office: 5484 (Lift 25/26), Department of Ocean Science

2. Class Time

TBC

3. Office hours

By appointment (Zoom)

4. Course Description

Credit points: 4
Pre-requisite: OCES 3003 and OCES 3160
Exclusion: Nil
Brief description:
This course provides a grounding in the theory required for comprehensive multi-disciplinary study of subtidal coastal ecosystems. Using coral reefs as an example, lectures will explore global values and threats on coral reefs, the physical, biogeochemical and ecological factors controlling their structure and function, and how to study these factors using integrative, multi-disciplinary research based on the concepts of ecosystem science.

5. Intended Learning Outcomes

At the end of this course, students should be able to:

1. explain complex interactions between oceanography and the ecology of coastal ecosystems
2. explain the structure and function of coral reef ecosystems and their basic drivers
3. formulate scientific hypotheses and design appropriate tests based on theoretical concepts and contemporary literature in the form of a robust scientific or consulting proposal
4. work collaboratively in a multi-disciplinary group to plan a (remote) field research project, maximising both safety and scientific return per unit effort and expense, including through the preparation of risk assessments
5. demonstrate familiarity with a wide range of sampling techniques used to survey subtidal coastal ecosystems
6. demonstrate familiarity with a range of oceanographic instrumentation used in coastal research
7. critically evaluate and explain sustainability issues relating to coral reef ecosystems
8. demonstrate a global perspective on coral reef ecosystems and links to cultures that depend on them.

6. Expected Preparation

A basic background in biological and physical oceanography is expected to be obtained from required OST courses (e.g., OCES 2001, 2002, and 2003). Students must have completed OCES 3003 (Field Methods in Marine Studies) and OCES 3160 (Ecology). Enrolment by research postgraduate students will be possible subject to approval.

7. Assessment Scheme

- Class participation: 15 %
- Literature review: 20 %
- ~~Research proposal report: 20 %~~
- ~~Group presentation: 15 %~~
- Final exam (**online, open book**): 30 %

Class participation

Participation will be assessed both informally (e.g., questions during class) and formally (e.g., online quizzes to be completed prior to classes on Canvas).

Literature review:

Pick a scientific question related to coral reef ecosystem science and perform a thorough literature review on it, then draft a coral reef "Case Study" chapter that could be included in the textbook based on your reading (see case study chapters in Section V of Weathers, 2021). Topics should focus on interdisciplinary interactions between at least two of (1) biological, (2) chemical and (3) physical process on coral reefs. Extra marks will be given for original data synthesis or analysis.

~~Group research proposal report:~~

~~As part of an assigned group, let by a Teaching Assistant (TA) acting as the Project Manager, formulate a scientific proposal to address an interdisciplinary question in coral reef ecosystem science that will be presented to you as a 'Request for Proposal' or 'Request for Tender' from a hypothetical client or funding body. Proposals will be assessed on the basis of justification (background information), clear objectives/hypotheses, a feasible approach, and realistic budget.~~

~~Group presentation:~~

~~Each group will present their research proposal to the class as an oral presentation and receive feedback on their proposal from their peers, TAs and instructors.~~

Final Exam:

The Final Exam will be open book and delivered online via Canvas. It will consist of multiple choice and essay style questions covering the entire course content

8. Student Learning Resources:

Primary reference textbook(s):

- Weathers, K.C., Strayer, D.L. and Likens, G.E. (2021) *Fundamentals of ecosystem science*. Second Edition. Academic Press, Waltham, Massachusetts, USA. 358 p. [**WEA**]
    - Library access: https://lbdiscover.ust.hk/bib/991013024045303412
- Bertness, M.D., Bruno, J.F., Silliman, B.R. and Stachowicz, J.J. (2014) *Marine community ecology and conservation*. Sinauer Associates, 560 p. [**BER**]
    - Library access: https://lbdiscover.ust.hk/bib/991013015207003412

Additional textbook(s):

- Kayanne, H. (2016) *Coral reef science: strategy for ecosystem symbiosis and coexistence with humans under multiple stresses*. Springer Japan, Tokyo, 101 p. [**KAY**]
    - Library access: https://lbdiscover.ust.hk/bib/991012683050103412
- Nybakken, J.W. and Bertness, M.D. (2004) *Marine biology: an ecological approach*. Sixth Edition. Benjamin Cummings, San Francisco, 579 p. [**NYB**]
    - Library access: https://lbdiscover.ust.hk/bib/991013015402803412

Supplementary materials

- A range of reading and web resources will be made available on Canvas (canvas.ust.hk) prior to each lecture.

9. Learning Activities

~~Three contact hours per week consisting of lectures, guest lectures, group meetings, student-led presentations, and discussion/review sessions. Pandemic situation permitting, a field trip will offer the chance to experience research activities on Hong Kong's coral reef ecosystems.~~

Flipped classroom consisting of independent study and regular assigned reading and presentations. Meetings with instructor to be booked by student on fortnightly basis. Field/lab mirroring with TAs will be arranged as possible.