

OCES 3302 Marine Pollution Source Tracking

Course objectives:

The marine environment is susceptible to a range wide of land-based pollution such as sewage, industrial effluent and terrestrial runoff. Very often the pollution source is either concealed or diffuse without an apparent point of discharge. The tracking of pollution source is essential to accurate assessment of the ecosystem and health consequences as well as effective mitigation and remedial actions. Pollution source tracking is a cross-disciplinary challenge, involving knowledge and skills in microbiology, molecular biology, chemistry, hydrodynamics, etc. This course serves to provide an in-depth understanding of the principle of pollution source tracking, the cutting-edge technology in the field and also case studies from Hong Kong and other parts of the world.

Learning outcomes:

Upon completion of this course, students will be able to:

1. Understand the nature and sources of land-based pollution in the marine environment
2. Understand the challenges in the tracking of the sources of land-based pollution in the marine environment
3. Critically evaluate the advantages and limitations of different pollution tracking methods
4. Explain the principal and communicate the results of pollution source tracking to non-specialists (e.g. policymakers and general public)

Course Instructor:

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Format and Course Assessment:

Two 80-minute lectures per week.

Course Assessment:

- Continuous assessment (80 %)
- Class participation (20 %)

Course outline:

Week	Lecture Topic
1 - 2	<ul style="list-style-type: none">- Course Introduction- Defining pollution- Water pollution control in HK
3 - 4	Sources of land-based pollution in the marine environment <ul style="list-style-type: none">- Point source vs. non-point source- Anthropogenic vs. natural
5 - 7	Routine / long-term pollution monitoring programs of beach water quality conducted by government agencies in HK and elsewhere in the world <ul style="list-style-type: none">- Purpose of the monitoring- Strategy, methods, reference standards- Deficiencies in the tracking of pollution source
8 - 9	Overcoming biases and limitations in routine monitoring program <ul style="list-style-type: none">- Issues associated with the loss of cultivability in bacteria- Genomic and proteomics approaches- Whole microbial community approach
10 - 11	Emerging biological tracers of pollution sources <ul style="list-style-type: none">- Pepper mild mottle virus- Detection methods- Quality control and assurance- Interpretation of resultsLimitations
12 - 13	Tracking of SARS-CoV-2 in sewage Case studies in North America, Europe and Hong Kong