# OCES 3302 – Marine Pollution Tracking

| | |
|---|---|
| **School:** | **School of Science** |
| **Subject Area:** | **Ocean Science** |
| **Course Credit:** | **3** |
| **Instructor:** | **LAU Stanley C K** |
| **Pre-requisite/co-requisite:** | **Nil** |

## Notes:

- The syllabi provided here is for reference only and may be subject to changes and adjustments as determined by the course instructors.

**Course title:** Marine Pollution Source Tracking
**Course code:** OCES 3302
**No. of credits:** 3
**Pre-requisites / co-requisites:** Nil

**Instructor**: Stanley Lau, Department of Ocean Science, HKUST
**Email: scklau@ust.hk**
**Office hours:** by appointment

## Course description

The marine ecosystem is vulnerable to a variety of pollution originating from land, including sewage, industrial waste, and runoff. These sources are often hidden or dispersed, lacking a single point of discharge. Identifying the origins of pollution is critical for the development of effective countermeasures and accurate evaluation of environmental and health impacts. Pollution source tracking is an interdisciplinary endeavor that requires expertise in microbiology, chemistry, hydrodynamics, and more. In this course you will:

- **Investigate** the sources of water pollution in our city and examine the approaches to control it
- **Gain** a comprehensive understanding of the principles and state-of-the-art technologies in pollution source tracking; and
- **Evaluate** real-world case studies from Hong Kong and around the world.

## Intended learning outcomes (ILOs)

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

1. **Identify** the sources and nature of land-based pollution in the marine environment;
2. **Appreciate** the challenges associated with tracking the sources of land-based pollution in the marine environment, including the limitations of current technologies and the need for interdisciplinary approaches;
3. **Compare** different pollution tracking methods for advantages and limitations;
4. **Communicate** effectively about pollution and its environmental impact observed in a given location in the society and the results of pollution source tracking to non-specialists, such as policymakers and the general public, using non-specialist language and appropriate visual aids.

## Syllabus

See Appendix I

## Required texts and materials

PowerPoint slides and reference materials will be uploaded to Canvas prior to each lecture.

**Assessment and grading**

This course will be assessed using criterion-referencing and grades will not be assigned using a curve. Detailed rubrics for each assignment are provided below, outlining the criteria for evaluation.

**Assessment tasks**

| Date | Assessment task* | % of the final grade |
|---|---|---|
| Throughout the course | End of lecture quizzes through iPRS | 20 |
| 21-Jul | Structured questions on canvas | 20 |
| 30-Jul | Structured questions on canvas | 20 |
| 8-Aug | Structured questions on canvas | 20 |
| 8-Aug | Project presentation | 20 |

*Marks will be released on Canvas within two weeks after individual assessment tasks

**Mapping of course ILOs to assessment tasks**

| Assessed task | ILOs | Explanation |
|---|---|---|
| End of lecture quizzes through iPRS | 1,2,3 | These quizzes will assess students' immediate understanding of the materials taught during lectures. |
| Structured questions on Canvas | 1,2,3 | The structured questions will assess students' comprehensive understanding of the lecture material and their ability to use higher-order thinking to tackle the scenarios given in the questions. |
| Group project presentation | 1,2,3,4 | The group project presentations will require students to demonstrate a comprehensive grasp of the knowledge learned in the course, apply the knowledge to a real-life situation observed in the field, and effectively communicate their findings on pollution sources identified. |

**Grading rubrics**

| Assessment tasks | Rubrics |
|---|---|
| End of lecture quizzes through iPRS | No rubrics. MC questions. |
| Structured questions on Canvas | No rubrics. Short questions with marking scheme released after each test. |
| Group project presentation | See Appendix II |

**Final grade descriptors**

| Grades | Short description | Elaborate on subject grading description |
|--------|------------------|------------------------------------------|
| A | Excellent performance | Demonstrates an outstanding grasp of the sources and nature land-based marine pollution, as well as the challenges in accurate pollution source tacking and risk evaluation. Exhibits exceptional ability to evaluate different pollution tracking methods and effectively communicate findings in an oral presentation. |
| B | Good performance | Demonstrates a strong understanding of the sources and nature land-based marine pollution, as well as the challenges in accurate pollution source tacking and risk evaluation. Shows proficiency in analyzing the pros and cons of various tracking techniques. Communicates reasonably well to different audiences. |
| C | Satisfactory performance | Displays a basic grasp of the sources and impacts of land-based marine pollution and the challenges in tracking them. Has an adequate ability to assess different tracking methods and convey information. |
| D | Marginal Pass | Exhibits a basic grasp of the subject matter, but has difficulty evaluating tracking techniques and communicating findings effectively. |
| F | Fail | Lacks fundamental understanding of the course concepts regarding pollution sources, tracking methods and their evaluation. Unable to communicate information effectively and coherently. |

**Course AI Policy**

The use of Generative AI in assessment tasks is permitted. However, you must provide proper credit for any use of generative AI. Failure to do so will be considered academic misconduct.

Please refer to the university's guidelines for more information: https://cei.hkust.edu.hk/en-hk/system/files?file=hkust_policy_principles_for_genai_for_tl_student_version.pdf

**Communication and feedback**

Marks for individual assessment tasks will be released via Canvas within two weeks of the assessment dates. Students who have questions about the marks should consult the instructor within 5 working days after the marks are released.

**Resubmission policy**

No resubmission allowed

**Academic integrity**

Students are expected to adhere to the university's academic integrity policy, uphold HKUST's Academic Hoor Code, and maintain the highest standards of academic integrity. The University has zero tolerance of academic misconduct. Please refer to https://registry.hkust.edu.hk/resource-library/academic-integrity for the University's definition of plagiarism and was to avoid plagiarism.

**Appendix I - Syllabus**

| Week | Topic |
|------|-------|
| 1 | - Course Introduction<br>- Defining pollution<br>- Water pollution control in HK<br>- Sources of land-based pollution in the marine environment<br>  - Point source vs. non-point source<br>  - Anthropogenic vs. natural |
| 2 | - Routine / long-term pollution monitoring programs of beach water quality conducted by government agencies in HK and elsewhere in the world<br>  - Purpose of the monitoring<br>  - Strategy, methods, and reference standards<br>  - Advantages and limitations |
| 3 | - Overcoming biases and limitations in routine monitoring program<br>  - Issues associated with the loss of cultivability in bacteria<br>  - Genomic and proteomics approaches<br>  - Whole microbial community approach |
| 4 | - Emerging biological tracers of pollution sources<br>  - Pepper mild mottle virus<br>  - Detection methods<br>  - Quality control and assurance<br>  - Interpretation of results<br>  - Limitations<br>- Tracking of SARS-CoV-2 in sewage<br>- Presentation of group project |

## Appendix II – Rubrics for group project presentation

| Criteria | Excellent (4) | Good (3) | Fair (2) | Poor (1) | Fail (0) |
|---|---|---|---|---|---|
| **Comprehensive research of the chosen topic** | Provides a **comprehensive** review of land use and potential sources of pollution at the selected field site, supported by ample literature (e.g., news articles, LEGCO documents, and government reports). | Provides a **sufficient** review of land use and potential sources of pollution at the selected field site, supported by literature (e.g., news articles, LEGCO documents, and government reports). | Provides a **basic** review of land use and potential sources of pollution at the selected field site, supported by few literature (e.g., news articles, LEGCO documents, and government reports). | **Fails** to provide a review of land use and potential sources of pollution at the selected field site. | No show |
| **Critical analysis** | Provides a **sophisticated and nuanced argument** about the potential sources of pollution at the selected field site, using observations from the field trip and information obtained through a literature search. | Provides a **solid argument** about the potential sources of pollution at the selected field site, using observations from the field trip and information obtained through a literature search. | Provides a **basic argument** about the potential sources of pollution at the selected field site, using observations from the field trip and information obtained through a literature search. | **Failure in providing a basic argument** about the potential sources of pollution at the selected field site, using observations from the field trip and information obtained through a literature search. | |
| **Suggestions for pollution mitigation** | Provides **well-researched, practical, and innovative solutions** to mitigate pollution at the selected field site, supported by strong evidence and examples. | Provides **practical solutions** to mitigate pollution at the selected field site, supported by sufficient evidence and examples. | Provides **basic suggestions** to mitigate pollution at the selected field site, with limited evidence or examples. | **Fails to provide meaningful or practical suggestions** to mitigate pollution at the selected field site, or provides suggestions without evidence. | |
| **Expression of own ideas** | Demonstrates a **high degree** of originality and creativity in expressing own ideas and perspectives, and provides **compelling** arguments and evidence to support them. | Demonstrates a **good level** of originality and creativity in expressing own ideas and perspectives, and provides **convincing** arguments and evidence to support them. | Demonstrates **some level** of originality and creativity in expressing own ideas and perspectives, but with some **gaps or inconsistencies** in arguments or evidence. | **Fails** to demonstrate originality or creativity in expressing own ideas and perspectives, or provides **weak or unsupported** arguments and evidence. | |
| **Proficiency in communication skills** | Demonstrates **excellent** presentation skills, including clarity, coherence, and fluency of expression, and proficient use of language, terminology, and visual aids. | Demonstrates **good** presentation skills, with mostly clear, coherent, and fluent expression, and appropriate use of language and terminology, and visual aids. | Demonstrates **fair** presentation skills, but with some issues in clarity, coherence, or fluency of expression. | Demonstrates **poor** presentation skills, with significant issues in clarity, coherence, or fluency of expression, or inappropriate use of language and terminology. | |