

## Annexe A: New/Revised Course Content in OBTL+ Format

### Course Overview

The sections shown on this interface are based on the templates [UG OBTL+](#) or [PG OBTL+](#)

If you are revising/duplicating an existing course and do not see the pre-filled contents you expect in the subsequent sections e.g. Course Aims, Intended Learning Outcomes etc. please refer to [Data Transformation Status](#) for more information.

Expected Implementation in Academic Year	AY 2024-25
Semester/Trimester/Others (specify approx. Start/End date)	Semester 1
Course Author * Faculty proposing/revising the course	Lee-Chua Lee Hong
Course Author Email	clhlee@ntu.edu.sg
Course Title	Environmental, Health and Safety Management
Course Code	EN2005
Academic Units	3
Contact Hours	39
Research Experience Components	Not Applicable

## Course Requisites (if applicable)

Pre-requisites	Nil
Co-requisites	Nil
Pre-requisite to	Nil
Mutually exclusive to	Nil
Replacement course to	Nil
Remarks (if any)	

## Course Aims

This course aims to provide you with a general understanding of environmental, health and safety (EHS) issues at the workplace in the various industries. Emphasis is to provide an overview on the common EHS issues encountered at the work place, as well as promoting a mindset and culture EHS management at the supervisory and managerial levels.

## Course's Intended Learning Outcomes (ILOs)

Upon the successful completion of this course, you (student) would be able to:

ILO 1	Describe basic concepts of common EHS issues of an industrial operation;
ILO 2	Describe the sources of EHS issues, quantify the risk and impact on the environment, health and safety of workers;
ILO 3	Assess various technical and administrative means (including personal protective equipment if appropriate) available to control the EHS risks created;
ILO 4	Identify legislative and regulatory requirements to control the EHS risks created.

## Course Content

This introductory course provides an overview of environmental, health and safety management in an industrial setting. The EHS topics covered in this course includes: EHS management system, accident and incident investigation, general safety, chemical safety, occupational hygiene, biological safety, noise, ergonomics, fire and explosion, air pollution and water pollution.

## Reading and References (if applicable)

Textbooks : References :

1. The Workplace Safety and Health Act and its subsidiary legislations. <http://www.mom.gov.sg/workplace-safety-health/wsh-regulatory-framework/Pages/workplace-safety-health-act.aspx>
2. The Environmental Protection and Management Act and its subsidiary legislations. Available from
3. World Health Organization (2004), Laboratory biosafety manual, 3rd Edition, WHO, Geneva.
4. Biological Agents and Toxins Act and its subsidiary legislation.
5. Brauer R L (2016), Safety and Health for Engineers, 3rd Edition, Wiley.
6. Woodside G and Kocurek D (1997), Environmental, Safety, and Health Engineering, Wiley.
7. Anton T J (1989), Occupational safety and health management, 2nd ed., McGraw-Hill.
8. Davies M L and Cornwell D A (2012), Introduction to Environmental Engineering, 5th Edition, McGraw-Hill.

## Planned Schedule

Week or Session	Topics or Themes	ILO	Readings	Delivery Mode	Activities
1	Introduction to EHS Mgt	1, 2, 3 and 4	Reading ppt slides	In-person	Lecture
2	Chemical Safety	1, 2, 3 and 4	Reading ppt slides	In-person	Lecture
3	Occupational Hygiene	1, 2, 3 and 4	Reading ppt slides	In-person	Lecture
4	General Health and Safety	1, 2, 3 and 4	Reading ppt slides	In-person	Lecture
5	Revise and Discuss on topics taught in week 1 to 4	1, 2, 3 and 4	Reading ppt slides	In-person	Revision and Discussion
6	Biosafety	1, 2, 3 and 4	Reading ppt slides	In-person	Quiz and Lecture
7	Biosafety	1, 2, 3 and 4	Reading ppt slides	In-person	Lecture
8	Noise	1, 2, 3 and 4	Reading ppt slides	In-person	Lecture
9	Ergonomics	1, 2, 3 and 4	Reading ppt slides	In-person	Lecture

Week or Session	Topics or Themes	ILO	Readings	Delivery Mode	Activities
10	Fire & Explosion	1, 2, 3 and 4	Reading ppt slides	In-person	Lecture
11	Air Pollution	1, 2, 3 and 4	Reading ppt slides	In-person	Lecture
12	Water Pollution	1, 2, 3 and 4	Reading ppt slides	In-person	Lecture
13	Revision and Discussion on topics taught from week 6 to 12	1, 2, 3 and 4	Reading ppt slides	In-person	Quiz, Revision and Discussion

## Learning and Teaching Approach

Approach	How does this approach support you in achieving the learning outcomes?
Lecture	Formal lectures on topics with in-class discussions Some calculation will be carried out in class together with you to help understand the concept taught during lectures as well as promote life-long learning.
Quiz	This helps you to achieve one or more of the outcomes as you need to do self-study and research.
Project	Project titles will cover selected industrial or environmental EHS issues, and you will conduct research and present on the technical background to the issues, elaboration and quantification of the impacts in a written report, and proposal of solutions through a power point presentation to the senior management of the hypothetical industrial organization.

# Assessment Structure

Assessment Components (includes both continuous and summative assessment)

No.	Component	ILO	Related PLO or Accreditation	Weightage	Team/Individual	Rubrics	Level of Understanding
1	Summative Assessment (EXAM): Final exam(Final Physical Exam)	1, 2, 3, 4	EAB SLOs c, e, f, g, i	60	Individual		
2	Continuous Assessment (CA): Test/Quiz(Quiz session)	1, 2, 3, 4	EAB SLOs c, e, f, g, i	20	Individual		
3	Continuous Assessment (CA): Project(Team Project)	1, 2, 3, 4	EAB SLOs c, e, f, g, i, j	20	Team	Analytic	Relational

## Description of Assessment Components (if applicable)

### Project

#### Objectives:

The main objective of the course project is to provide you an opportunity to apply your environmental, health and safety (EHS) knowledge in the review of an EHS issue and develop an EHS plan for the management of the EHS issue from the perspective of a hypothetical organization.

#### You would need to:

- collect information on current knowledge and risk of the EHS issue chosen; (ILO 1, 2)
- elaborate on technical or management aspects of the EHS issue; and (ILO 2 and 4)
- propose a method your organization will manage the EHS issue. (ILO 1, 3, 4)

#### Requirements:

- Form your work group; up to 3 students. Note the name of the group leader.
- Select two (2) topics (in order of preference) from the project list provided or propose a suitable topic and select one (1) topic from the project list provided. The reason for having two (2) topic choices per group is to reduce excessive duplication of project reports of the same topic title through assignment of one of the two choices.
- Submit your selection by Monday of week 7 electronically by email to fuigan@yahoo.com.
- Selections will be notified by email by Saturday of week 7.
- Submission should be done electronically via email to fuigan@yahoo.com by the group leader by Monday of week 11.

Late submission: within 1 week – 20% penalty; beyond 1 week – 40% penalty.

#### Deliverables:

- Report and presentation slides:
  - a group report of approximately 3000 words (main text) with references list, and if necessary, suitable/reasonable amount technical attachment (no more than 10 pages); and
  - a powerpoint presentation of no more than 15 slides following closely the structure of the report.

Note: there will be no presentation required. The presentation slides are for a hypothetical presentation that

your work group will make to the management of the hypothetical organisation to propose how to manage the EHS issue.

7. Structure of report:

- a. Report Title;
  - b. Group Details (Names of Students);
  - c. Problem Definition (i.e. how the EHS issue affects your organization);
  - d. Background (i.e. brief discussion of the EHS issue selected);
  - e. Theoretical Development (e.g. where applicable, exposure limits, equations, technical aspects of control, toxicological knowledge, detection technology, etc), Risk Assessment and Risk Control Measures; and
  - f. Management Options and Management Plan.
8. Structure of powerpoint presentation – no fixed structure

#### Formative Feedback

You will be able to view your individual quiz results through Blackboard Grade Centre. As the course is taught entirely by external resources, meetings will be at towards the end of the lecture, or virtually (by appointment only) to view and discuss your quiz questions and results.

## **NTU Graduate Attributes/Competency Mapping**

This course intends to develop the following graduate attributes and competencies (maximum 5 most relevant)

<b>Attributes/Competency</b>	<b>Level</b>
Adaptability	Intermediate
Care for Environment	Intermediate
Care for Society	Advanced
Collaboration	Intermediate

# Course Policy

## Policy (Academic Integrity)

Good academic work depends on honesty and ethical behaviour. The quality of your work as a student relies on adhering to the principles of academic integrity and to the NTU Honour Code, a set of values shared by the whole university community. Truth, Trust and Justice are at the core of NTU's shared values. As a student, it is important that you recognize your responsibilities in understanding and applying the principles of academic integrity in all the work you do at NTU. Not knowing what is involved in maintaining academic integrity does not excuse academic dishonesty. You need to actively equip yourself with strategies to avoid all forms of academic dishonesty, including plagiarism, academic fraud, collusion and cheating. If you are uncertain of the definitions of any of these terms, you should go to the academic integrity website for more information. On the use of technological tools (such as Generative AI tools), different courses / assignments have different intended learning outcomes. Students should refer to the specific assignment instructions on their use and requirements and/or consult your instructors on how you can use these tools to help your learning. Consult your instructor(s) if you need any clarification about the requirements of academic integrity in the course.

## Policy (General)

### (1) General

Students are expected to take all scheduled assignments and tests by due dates. Students are expected to take responsibility to follow up with course notes, assignments and course related announcements. Students are expected to participate in all group project discussions and activities.

## Policy (Absenteeism)

Valid reasons include falling sick supported by a medical certificate and participation in NTU's approved activities supported by an excuse letter from the relevant bodies. There will be no make-up opportunities for in-class activities.

## Policy (Others, if applicable)

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Last Updated By: Yang, En-Hua

## **Rubrics for EN2005 Environmental Health and Safety Management**

### Appendix 1

#### **Course Project**

##### **Objectives:**

The main objective of the course project is to provide you an opportunity to apply your environmental, health and safety (EHS) knowledge in the review of an EHS issue and develop an EHS plan for the management of the EHS issue from the perspective of a hypothetical organization.

You would need to:

- a. collect information on current knowledge and risk of the EHS issue chosen; (ILO 1, 2)
- b. elaborate on technical or management aspects of the EHS issue; and (ILO 2 and 4)
- c. propose a method your organization will manage the EHS issue. (ILO 1, 3, 4)

##### **Requirements:**

1. Form your work group; up to 3 students. Note the name of the group leader.
2. Select two (2) topics (in order of preference) from the project list provided or propose a suitable topic and select one (1) topic from the project list provided. The reason for having two (2) topic choices per group is to reduce excessive duplication of project reports of the same topic title through assignment of one of the two choices.
3. Submit your selection by **Monday of week 7** electronically by email to [fuigan@yahoo.com](mailto:fuigan@yahoo.com).
4. Selections will be notified by email by **Saturday of week 7**.
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Late submission: within 1 week – 20% penalty; beyond 1 week – 40% penalty.

##### **Deliverables:**

6. Report and presentation slides:
  - a. a group report of approximately 3000 words (main text) with references list, and if necessary, suitable/reasonable amount technical attachment (no more than 10 pages); and
  - b. a powerpoint presentation of no more than 15 slides following closely the structure of the report.

Note: there will be *no* presentation required. The presentation slides are for a hypothetical presentation that your work group will make to the management of the hypothetical organisation to propose how to manage the EHS issue.

7. Structure of report:
  - a. Report Title;
  - b. Group Details (Names of Students);
  - c. Problem Definition (i.e. how the EHS issue affects your organization);
  - d. Background (i.e. brief discussion of the EHS issue selected);
  - e. Theoretical Development (e.g. where applicable, exposure limits, equations, technical aspects of control, toxicological knowledge, detection technology, etc), Risk Assessment and Risk Control Measures; and
  - f. Management Options and Management Plan.
8. Structure of powerpoint presentation – no fixed structure

**Marking Criteria** (20% of final grade)

By default, you would get the same score as your team. However, your score may vary should there be evidence that you had not contributed to your team

	Marking Criteria	Marks
<b>Total</b>		<b>100</b>
Problem Definition and Background	Sufficient description of EHS Issues, Affects and Impacts.	5
Theoretical Development	Sufficient development of theoretical aspects. Key issues, technological and management options had been adequately researched and discussed.	20
Risk Assessment	Appropriate Risk Assessment carried out and the risk levels substantiated with good evidence	10
Risk Control	Rick control measures suitably identified, criteria for selection or comparison established, systematically compared and discussed.	10
Management Options and Plan	Sound management proposal and identification of solution	30
Presentation slides	Succinct and clear, good use of visual aids. Presents the project and achieves objective of persuading management to adopt option suggested.	20
Referencing	Adequate support references provided in an acceptable reference style.	5

*The assessment for the project is heavily reliant on students working closely as a team to complete the project. In order to account for your Individual Contribution to the team, the Modification Factor (MF) will be applied to account for your individual contribution to the project work. The MF is derived from panel judges' feedback, minutes of meetings and peer assessment. For more details on the MF calculation, please see Appendix 2.*

## Appendix 2: Assessment Criteria for Peer Assessment

Performance Indicators	Performance Level/Criteria			
	Outstanding: 4	Good: 3	Average, meet expectation: 2	Below expectations: 1
<b>Collaborative behaviour</b>	Cooperative and always delivered assigned tasks on time. Take initiative to help other to ensure success of team project.	Cooperative and always delivered assigned tasks on time. Willing to assist others upon request.	Stop short at delivering assigned tasks, sometimes after reminder(s).	Uncooperative, non-committed, always miss deadlines.
<b>Quality of works</b>	Quality of works higher than overall group quality, or go extra miles to assist teammate to enhance the quality of group works.	Good quality of deliverables under individual responsibility.	Acceptable quality of deliverables under individual responsibility.	Quality of works not acceptable.
<b>Ideas &amp; participations</b>	Active participation and initiatives, good ideas & suggestions in enhancing the quality of group works.	Contributed suggestions and ideas to enhance the quality of group works.	Somewhat contributed in enhancing the quality of group works.	Did not participate in group works.

Average Peer Assessment Score	MF
<b>3.51 to 4.00</b>	1.05
<b>2.76 to 3.50</b>	1.00
<b>2.51 to 2.75</b>	0.95
<b>2.00 – 2.50</b>	0.9
<b>Below 2.0</b>	Separate Assessment

Peer assessment exercise will be anonymous and done towards the end of the semester.

For student who has average peer assessment score below 2.0, Course coordinator might contact/call up the student as well as the Project Manager, and/or contact any other team member(s) to further assess the appropriate MF.

In addition to peer assessment, MF might be moderated by course coordinator and panel judges from the interaction during consultation, minutes of meeting, feedbacks from PM and other team