



LANDMARK UNIVERSITY, OMU-ARAN

COLLEGE: COLLEGE OF SCIENCE AND ENGINEERING

DEPARTMENT: CHEMICAL ENGINEERING

PROGRAMME:

COURSE COMPACT FOR: Industrial Hazards and Environmental Pollution

Course

Course code: CHE 517

Course title: Industrial Hazards and Environmental Pollution

Credit unit: 3 Unit

Course status: Elective

Lecturer's Data

Name of the lecturer: Dr. Babayemi A.K

Qualifications obtained: MSc. (USSR), Ph.D. (Unizik) COREN

Department: Chemical Engineering

College: Science and Technology

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Office Location: Room FC02D, First College Building

Consultation Hours: 11:00 – 2:00 pm daily

Name of the lecturer: Dr. FAKINLE B.S

Qualifications obtained: B.Sc. (LASU), MSc. (Ife), Ph.D. (Ife) COREN

Department: Chemical Engineering

College: Science and Technology

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Office Location: Room A009, First College Building

Consultation Hours: 12:00 – 3:00 pm daily

Course Content

Gaseous, liquid and solid pollution: Measurement. Types of Hazards; Routes of Exposure to Hazards, air pollution control, water pollution control, solid waste control, Design and Objectives of pollution control system. Case studies, waste recycling.

Course Description:

The course is an aspect in Chemical Engineering that deals with the issue of the environment in terms of Land, Water and Air pollution. It also identifies the various hazards that are likely to occur in the industries. The will identify both the natural and anthropogenic sources, Monitoring and Control of various pollution scenarios. It also covers the practices and technologies that are applied to the prevention of pollution and to the cleaning and control of industrial emissions.

Course Justification

This course provides a bridge for prospecting environmental manager by focusing on an integrated approach to managing environmental pollution problems both within and outside industrial operations.

Course Requirement:

All that is required by students for this course is the basic knowledge of chemical reactions.

Method of Grading

| S/N | Grading | Score (%) |
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| 1. | Test | 20 |
| 2. | Assignment | 10 |
| 3. | Final Examination | 70 |
| | Total | 100 |

Course Delivery Strategies

Lecturing/teaching method as well as audio – visual aid will be adopted; several environmental pollution scenarios will be presented in an interactive manner. Class works/term paper will also be given to engage the students.

LECTURE CONTENT

| Week | Topic | Objective | Description |
|------|--------------------|--|--|
| 1 | Industrial Hazards | At the end of this class the student should be able to <ul style="list-style-type: none">Describe the likely industrial hazardsDifferentiate between risk and HazardIdentify the mitigating measure that should be in place in order to avoid occurrence of hazards. | <u>First hour:</u> Source and types of Hazard. <u>Second hour:</u> Classes of Hazard and their representation <u>Third hour:</u> Routes of Exposure to Hazards. |
| 2 | Hazard Management | Student will be familiar with <ul style="list-style-type: none">safety informationthe risk involved | <u>First hour:</u> Process Safety information. <u>Second hour:</u> Hazard of Chemicals <ul style="list-style-type: none">i. LD₅₀/LC₅₀ii. Threshold |

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| | | <p>exposed to potential hazards</p> | <p>iii. limit value Permissible exposure limit</p> <p>iv. Immediate Dangerous to life or Health (IDLH)</p> <p><u>Third hour:</u> Hazardous Materials and Material Safety Data Sheet (MSDS)</p> |
| 3 | Air Pollution | <p>Student will have knowledge of</p> <ul style="list-style-type: none"> • What air pollution is all about • Origin of Pollutants • The impact of air pollution on human, animals, plants, materials and the environment. | <p><u>First hour:</u> Primary and Secondary pollutants.</p> <p><u>Second hour:</u> Typical gaseous pollutants and their sources.</p> <ul style="list-style-type: none"> • Point source • Area source • Volume source • Mobile (line) source. <p><u>Third hour:</u> Effect of Air pollution, dispersion of air pollutant.</p> |
| 4 | Air Pollution Control | <ul style="list-style-type: none"> • This will take about mitigation methods. • The various permitted limit of pollutants in the ambient air will be considered | <p><u>First hour:</u> Process / Production or raw material Change</p> <p><u>second hour:</u> Abatement of pollution after formation</p> <p><u>Third hour:</u> The use of regulatory and persuasion</p> |
| 5 | Abatement of gaseous pollution after formation | <p>This will give the student a detail abatement techniques in air pollution control.</p> | <p><u>First hour:</u> Absorption using wet absorption</p> <p><u>second hour:</u> Adsorption, Condensation</p> <p><u>Third hour:</u> NO_x emission control, SO₂ emission control.</p> |
| 6 | Particulate emission control | <p>The objective is to evaluate the different particulate mechanism</p> | <p><u>First hour:</u> Dry process</p> <p><u>second hour:</u> wet process</p> <p><u>Third hour:</u> Comparison</p> |

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| | | | between wet and dry processes. |
| 7 | Water pollution | Students will distinguish between point and non point sources of all the major types of pollution that will cause impaired water | <u>First Hour:</u> Types of water pollution sources <u>Second Hour:</u> Causes of Impaired water <u>Third Hour:</u> Clean Act |
| 8 | Mid Semester Test | | |
| 9 | Water pollution control | The student will learn about the major steps in water treatment process to reduce the ecological effects of raw sewage. | <u>First Hour:</u> Waste water treatment <u>Second Hour:</u> Waste water management <u>Third Hour:</u> |
| 10 | Solid waste management | At the end of this topic the student will be familiar with various ways by which solid waste can be treated. | <u>First Hour:</u> Sources of solid waste <u>Second Hour:</u> Solid waste treatment <ul style="list-style-type: none"> • Treatment by land fill • Destructive degradation to provide less harmful by-products. • Treatments of wastes using biological systems • Treatment by incineration <u>Third Hour:</u> |
| 11 | Waste recycling | At the end of this topic the student will see the benefit of recycling in terms of reducing air pollution and land pollution. | <u>First Hour:</u> Introduction, Recycling of Consumer waste <u>Second Hour:</u> Recycling of industrial waste <u>Third Hour:</u> Recycling Codes |
| 12 | Case Studies of scenario in air pollution | At the end of this topic the student will see the deleterious effect of pollution on humans, plants | <u>First Hour:</u> Bhopal <u>Second Hour:</u> Seveso <u>Third Hour:</u> Case on Water and Solid Pollution |

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| | | animals and the environment having considered different environmental pollution scenarios | |
| 13 | Revision | | |

Questions:

1. (a) What is Hazard Management
- (b) Toxicity Information is used to describe the toxicological ratings of hazards of chemicals, hence write short on the following:
 - (i) LD₅₀ (ii) LC₅₀ (iii) MSDS

2. (a) List the mechanisms which particulate emission control depends on

- (b) Calculate the settling velocity of a particle moving in a gas stream, assuming that

d_p , the particle diameter = 45 μm

g , gravity force = 980 cm/s^2

ρ_p , particle density = 0.899 g/cm^3

ρ_a , fluid density = 0.012 g/cm^3

μ , fluid viscosity = 1.82×10^{-4} g/cms

$C_f = 1.0$ (if applicable)

3. (i) Ozone is formed by the action of _____ light on _____ and _____
- (ii) _____ are those emitted directly into the _____ while _____ are produced by the interaction among two or more _____
- (iii) _____ and _____ are problems associated with solid waste management by land fills
- (iv) the four basic process design parameters of a waste incinerator are _____, _____, _____ and _____
- (v) write in full the following acronyms NESREA, AQS, WHO, FEPA, STEL

HOD's COMMENTS: _____

Name: _____ Signature _____ Date: _____