

Andalas University  
Faculty of Engineering  
Department of Environmental Engineering

**Environmental Engineering Undergraduate Program**

ABET Course Syllabus

Odd Semester 2018/19

1. *Course number and name*

**TLI 373: Environmental Toxicology**

2. *Credits and contact hours*

**2 Credit Hours**

3. *Instructor's or course coordinator's name*

**Instructor** : Tivany Edwin, M.Eng, Taufiq Ihsan, MT; Lecturers of  
Environmental Engineering

**Course coordinator** : Tivany Edwin, M.Eng, Lecturer of Environmental Engineering

4. *Text book, title, author, and year*

*Text book*

Soemirat. 2009. Toksikologi Lingkungan. Gajah Mada University Press. Yogyakarta

W. Williams Hughes. 1996. Essentials of Environmental Toxicology. Taylor & Francis. Philadelphia.

5. *Specific course information*

*a. brief description of the content of the course (catalog description)*

Fundamental of environmental toxicity: definition, toxicity, intoxication; types of xenobiotics: classification, bio toxin, chemistry of bio toxin, metals; eco kinetics: transport and transformation, fate of xenobiotics, persistency, mobility, accumulation; pharmacokinetics: entry (inhalation, oral, and dermal), absorption, diffusion, distribution, metabolism(animals and plants); biological effects (hepatotoxicity, pneumotoxicity, neurotoxicity, hematotoxicity, teratotoxicity, etc.); toxicology of pesticides, toxicity test; and research on toxicology

*b. prerequisites or co-requisites*

TLI 271 Environmental Health

TLI 371 Environmental Epidemiology

*c. indicate whether a required, elective, or selected elective course in the program*

Required course for Environmental Engineering

6. *Specific goals for the course*

*a. Specific outcomes of instruction*

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

- i. student will be able to determine and explain the definition of toxicology, toxin, poisoning and toxicity and describe the level of toxicity and the objectives of environmental toxicology
- ii. student will explain the classification of xenobiotics/toxins
- iii. students will explain definition of eco kinetics, sources of poison, toxic emissions and transport, eco kinetics process (transport in water, transport between water and air, transport on particles, transport in soil, groundwater transport, transport in air), the process of transformation of abiotic and biotic and the estimate of the fate of toxins
- iv. students will demonstrate pharmacokinetic of xenobiotics (portal entry of toxin, dose versus concentration, absorption, distribution, metabolism and excretion)

- v. students will be able determine the principle of the biological effect on the cell element, on enzymes, on DNA and RNA, on target organs and the effect based on symptoms
- vi. students will be able to interpret data of toxicity test, quantitative analysis, levels of toxicity tests, toxicity test and the food chain, toxicity test based on dose and response, extrapolation bioesei to humans and monitoring
- vii. students will demonstrate the purpose of toxicological research, selection of animals test, toxicity research in laboratory scale, aquatic toxicology research, solid waste toxicology research, toxicological research in air
- viii. students will be able to explain definition and use of pesticides, classification of pesticides, definition and toxicity of insecticide, the classification of insecticides, insecticides in the environment, herbicides, fungicides, rodenticides, and fumigants
- ix. students will be able to apply toxicology case research

b. *Explicitly indicate which of the student outcomes listed in Criterion 3 or any other outcomes are addressed by the course*

Course addresses/ supports ABET Student Outcome(s): a, b, c, d, e, f, g, h, j, k

**Course Learning Outcomes mapped to ABET Student Outcomes:**

No	Course Learning Outcomes	ABET Student Outcomes
i.	student will be able to determine and explain the definition of toxicology , toxin, poisoning and toxicity and describe the level of toxicity and the objectives of environmental toxicology	j
ii.	student will explain the classification of xenobiotics/toxins	a, j
iii.	students will explain definition of eco kinetics, sources of poison, toxic emissions and transport, eco kinetics process (transport in water, transport between water and and air, transport on particles, transport in soil, groundwater transport, transport in air), the process of transformation of abiotic and biotic and the estimate of the fate of toxins	a, b, c, e, g, k
iv.	students will demonstrate pharmacokinetic of xenobiotics (portal entry of toxin, dose versus concentration, absorption, distribution, metabolism and excretion)	a, b, c, e, g, k
v.	students will be able determine the principle of the biological effect on the cell element, on enzymes, on DNA and RNA, on target organs and the effect based on symptoms	a, c, e, j
vi.	students will be able to interpret data of toxicity test, quantitative analysis, levels of toxicity tests, toxicity test and the food chain, toxicity test based on dose and response, extrapolation bioesei to humans and monitoring	a, b, c, e, g, k
vii.	students will demonstrate the purpose of toxicological research, selection of animals test, toxicity research in laboratory scale, aquatic toxicology research, solid waste toxicology research, toxicological research in air	a, b, c, e, g, k
viii.	students will be able to explain definition and use of pesticides, classification of pesticides, definition and toxicity of insecticide, the classification of insecticides, insecticides in the environment, herbicides, fungicides, rodenticides, and fumigants	a, c, e, j
ix.	students will be able to apply toxicology case research	a, b, c, d, e, f, g, h, k
x.	students will be able to work in team	d, e, g
xi.	students will be able to communicate effectively	d, e, g

7. *Brief list of topics to be covered*

- i. Introduction to the basic principles of environmental toxicology
- ii. Classification of xenobiotics/toxins
- iii. Eco kinetics
- iv. Pharmacokinetics
- v. Biological effects
- vi. Quantitative analysis of toxicity test
- vii. Toxicological research
- viii. Pesticides toxicology
- ix. Toxicology case research

**Topics (Weekly Outlines):**

<b>Week</b>	<b>Topic</b>
1	Introduction to the basic principles of environmental toxicology
2	Classification of xenobiotics/toxins
3	Eco kinetics – 1
4	Eco kinetics – 2
5	Pharmacokinetics – 1
6	Pharmacokinetics – 2
7	Biological effects
8	<b>Mid Term Exams</b>
9	Quantitative analysis of toxicity test – 1
10	Quantitative analysis of toxicity test – 2
11	Toxicological research
12	Pesticides toxicology
13	Cases in Toxicological research – 1
14	Cases in Toxicological research – 2
15	Cases in Toxicological research – 3
16	<b>Final Term Exams</b>

The length of one session: **100 minutes**

**Assessment and Evaluation Criterion:**

No	Course Learning Outcomes	Methods of Assessment
i.	student will be able to determine and explain the definition of toxicology , toxin, poisoning and toxicity and describe the level of toxicity and and the objectives of environmental toxicology	Disscusion #1, Mid Term Exams
ii.	student will explain the classification of xenobiotics/toxins	Assignment #1, Mid Term Exams
iii.	students will explain definition of eco kinetics, sources of poison, toxic emissions and transport, eco kinetics process (transport in water, transport between water and and air, transport on particles , transport in soil, groundwater transport, transport in air), the process of transformation of abiotic and biotic and the estimate of the fate of toxins	Homework #1, Mid Term Exams
iv.	students will demonstrate pharmacokinetic of xenobiotics (portal entry of toxin, dose versus concentration, absorption, distribution, metabolism and excretion)	Homework #2, Mid Term Exams
v.	students will be able determine the principle of the biological effect on the cell element, on enzymes, on DNA and RNA, on target organs and the effect based on symptoms	Homework #3, Mid Term Exams
vi.	students will be able to interpret data of toxicity test, quantitative analysis, levels of toxicity tests, toxicity test and the food chain, toxicity test based on dose and response, extrapolation bioesei to humans and monitoring	Assignment #2, Mid Term Exams
vii.	students will demonstrate the purpose of toxicological research, selection of animals test, toxicity research in laboratory scale, aquatic toxicology research, solid waste toxicology research, toxicological research in air	Participation in Group, Final Term Exams
viii.	students will be able to explain definition and use of pesticides, classification of pesticides, definition and toxicity of insecticide, the classification of insecticides, insecticides in the environment, herbicides, fungicides, rodenticides, and fumigants	Assignment #3, Mid Term Exams
ix.	students will be able to apply toxicology case research	Presentation, Group Report, Participation in Group, Final Term Exams
x.	students will be able to work in team	Participation in Group
xi.	students will be able to communicate effectively	Participation in Group

**Evaluation Criterion:**

Mid Term Exams	30 points
Final Term Exams	30 points
Assignments, Home works	30 points
Quiz	10 points
Maximum points: 100 points	

**Grading will be as follows:**

Final points	Grade	Final points	Grade
$\geq 85$	A	$\geq 60 - < 65$	C <sup>+</sup>
$\geq 80 - < 85$	A <sup>-</sup>	$\geq 55 - < 60$	C
$\geq 75 - < 80$	B <sup>+</sup>	$\geq 50 - < 55$	C <sup>-</sup>
$\geq 70 - < 75$	B	$\geq 40 - < 50$	D
$\geq 65 - < 70$	B <sup>-</sup>	$0 - \leq 40$	E

**Prepared by:** Tivany Edwin, M.Eng  
**Date of preparation:** 01 September 2015

**Approved by:** Group of Environmental Health  
**Date of Approval:** 01 September 2015