Course Syllabus

1. **Course Title:: Air and noise pollution Control Techniques**
2. **Course Code**: **ANCT434210**
3. **Credit Units:** 3 credits (3/0/6) (3 units of theory/ 0 unit of practice/ 6 units of self-study)

   Duration: 15 weeks (3 hours of theory + 0 hours of practice, and 6 hours of self-study per week)
4. **Course Instructors:**

   1 / MSc Hoang Thi Tuyet Nhung

   2/ PhD Nguyen Quynh Mai
5. **Course Requirements:**

   Prerequisite courses: None

   Previous courses: Process and Equipment in Environmental Engineering

   Parallel courses: None
6. **Course Description**

Students are equipped with the basic knowledge about techniques to control and remove participates and air pollutants as well as reduce noise pollution. Skills in the selection of technological process, analysis and calculate ventilation system and air emission; units in the industrial air pollution treatment systems.

7. **Course Goals**

Goals	Goal description	Programme Expected learning outcome (ELOs)
G1	Knowledge about participates and air pollution treatment technologies, air emission ventilation system and noise pollution.	ELO3
G2	Ability to describe the effect air pollution and noise pollution; discuss the method to solve the problems	ELO4
G3	Use documents, books in English	ELO11
G4	Ability to explain the principal of equipments for participate, air pollution treatment, ventilation system and reduce noise pollution in the industry	ELO13 ELO14

8. Course Learning Outcomes (CLOs)

CLOs		CLO Description	Programme ELOs
G1	CLO1	Demonstrate the concept of participates, air pollutants, natural and artificial methods of ventilation; the concept of noise pollution	ELO3
	CLO2	Calculate the units for participates and air pollution treatment	
G2	CLO3	Analyse the effect of air pollution, noise pollution.	ELO4
	CLO4	Discuss about the methods to control air pollutants, noise pollution, ventilation.	
G3	CLO5	Use documents, books in English	ELO11
G4	CLO6	Explain the principal of equipments, technological units for air pollution treatment	ELO13
	CLO7	Select suitable technology for noise pollution control; participates, air pollution treatment system; ventilation system	ELO14

9. Learning Resources

- Textbooks:

Karl B. Schnelle, ***Air pollution control technology Handbook,*** CRC Press LLC, 2002

Lawrence K. Wang, ***Advanced Air and Noise Pollution Control***, Humana press, 2005.

- References**:**

[1] Trần Ngọc Chấn, ***Ô nhiễm không khí và xử lý khí thải***, tập 2 và 3, NXB KHKT Hà Nội

[2] PGS. TS. Nguyễn Đinh Tuấn, Kiểm soát ô nhiễm không khí, Viện Môi trường và Tài nguyên, ĐHQG Tp.HCM, 2007.

[3] Trần Ngọc Chấn, **Kỹ thuật thông gió**, NXB. Xây dựng, 1998.

[4] Richard C. Flagan và John H. Seinfeld***, Fundamentals* of *Air pollution Engineering,*** Prentice-Hall, Inc., 1998.

10. Student assessment

- Grading scale: 10
- Assessment plan:

Type	Content	Timeline	Assessment method	CLOs	Rate (%)
Exercise					**20**
Exercise #1	Calculate pollutant loads and the treatment efficiency	Week 3	Exercises in class	CLO2	10
Exercise #2	Demonstrate a ventilation system	Week 5	Group in class	CLO1 CLO4	10

Report					**30**
Exercise #1	To collect the concept of participate treatment equipments and presentation in class, using English documents.	4-6	Presentation	CLO4 CLO5 CLO6	
Final accessment					**50**
	- Analyse the effect of air pollution, noise pollution - Explain the air pollution treatment equipments . - Select suitable technology for noise pollution control; participates, air pollution treatment system; ventilation system		Final test	CLO3 CLO6 CLO7	50

11. Course Content:

Week	Contents	CLOs
1-3	Chapter 1: **AIR POLLUTION CONTROL (9/0/18)**	
	A/* Content and pedagogical methods in class*: **Content** **1.1. Recipe for an Air pollution problem** *1.1.1. Concept of air pollution* *1.1.2. Source of Air pollution* *1.1.3. Mereological Parameters Affecting transport of pollutants* *1.1.4. The effects of air pollution* **1.2. Charaterizing the atmosphere** **1.3. Atmosphere diffusion Modeling** *1.3.1. Mereological background: Inversions, the Diurnal Cycle,, Principal smoke-plume Models* *1.3.2. The tall stacks* *1.3.3. Classifying Sources by method of emission* 1.3.4. *Atmospheric-diffusion model* **Pedagogical methods:** Presentation, Dicussion, Solving exercise	CLO1 CLO3 CLO4
	***B/* Self-study content** - Refer to the real example of air pollution control - Solve the exercises	CLO1 CLO2 CLO4
4-5	Chapter 2: **VENTILATION SYSTEM (6/0/12)**	
	A/* Content and pedagogical methods in class*: **Content** **2.1. Air Ventilation** *2.2.1. Rate of air change* *2.2.2. Rate of minimum air velocity*	CLO1 CLO4

	2.2.3. Heat removal *2.2.4. Ventilation fan* **2.2. Hood and Ductwork Design** *2.1.1. Hood Design* *2.1.2. Duct Design* *2.1.3. Effect of entrance into a hood* *2.1.4. Total energy loss* *2.1.5. Fan power* *2.1.6. Hood-duct example* **Pedagogical methods:** Presentation, Dicussion, Solving exercise	
	***B/* Self-study content** - Solve the exercises - Teamwork with chapter 3	CLO1 CLO4
6-8	**Chapter 3 : FUNDAMENTALS OF PARTICULATE CONTROL (9/0/18)**	
	A/* Content and pedagogical methods in class*: **Content** 3.1. Collection Mechanisms 3.2. Cyclone design 3.3. Filtration an Baghouse 3.4. Design and application of wet scrubbers 3.5. Electrostatic Precipitators **Pedagogical methods:** Presentation, Dicussion, Solving exercise, *students presentation*	CLO2 CLO5 CLO6
	***B/* Self-study content** - Calculating cyclone - Solve the exercises	CLO2 CLO5
9-13	Chương 4: **AIR POLLUTION TREATMENT (15/0/30)**	
	A/ A/* Content and pedagogical methods in class*: **Content** **4.1. HAP and VOC control** *4.1.1. Adsorption* *4.1.2. Thermal Oxidation* *4.1.3. Condensation* *4.1.4. Biofiltration* **4.2. NO_x Control** *4.2.1. NO_x from combustion* *4.2.2. Control Techniques: Combustion control techniques, flue gas treatment techniques* **4.3. SO_x Control** *4.3.1. H_2S control*	CLO2 CLO5 CLO6

	4.3.2. SO_2 (and HCl) removal *4.3.3. SO_3 and Sulfuric acid* **Pedagogical methods:** Presentation, Dicussion, Solving exercise	
	***B/* Self-study content** - *Calcutating flue gas treatment*	CLO2 CLO5
14-15	Chapter 5: **NOISE POLLUTION AND NOISE CONTROL (6/0/12)**	
	A/ Các nội dung giảng dạy trên lớp: **5.1 Noise pollution** *5.1.1. Introduction* *5.1.2. Characteristics of noise* *5.1.3. Sources* *5.1.4. Effects* *5.1.5. Measurements* **5.2. Noise control** *5.2.1. Introduction* *5.2.2. The physics of noise* *5.2.3. Indoor sound* *5.2.4. Out -of -dour sound* *5.2.5. Noise reduction* *5.2.6. Sound Isolation* *5.2.7. Vibrations* *5.2.8. Design example* **Pedagogical methods:** Presentation, Dicussion, Solving exercise	CLO1 CLO3 CLO4 CLO7
	***B/* Self-study content** - Refer to noise reduction materials	CLO3 CLO5

12. Learning Ethics:

+ The copy of all the exercises and translated information from internet are banned. If this thing is detected, the process score of students will be zero; and in serious case, these students who joined this problem, will be banned from taking their final exam.
+ In case of the detection of students who replace the others in the exam, all of them will be suspended or leaved the learning program.

13. Date of first approval:

14. Date of first approval: August 1st, 2012

Dean of the faculty **Head of department** **Complier**

A/Prof. Nguyen Van Suc **MSc Nguyen Thi Minh Nguyet** **Hoang Thi Tuyet Nhung**

1. Date and Up-to-date content

1st time: - Update content and integrate air pollution control course with Noise pollution noise control course adjusted in 2015	Instructor: Hoang Thi Tuyet Nhung Head of Department: Dr. Tran Thi Kim Anh