Subject Description Form

Subject Code	CSE20331
Subject Title	Air and Noise Pollution Studies for ESD
Credit Value	3
Level	2
Exclusions	CSE331 Air and Noise Pollution Studies or CSE336 Air and Noise Pollution Studies or CSE30331 Air and Noise Pollution Studies for Civil Engineering
Objectives	To provide basic knowledge about the causes, impact and control of air and noise pollution.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: a. have the basic knowledge of contemporary air and noise pollution, including chemistry and/or physics involved, commonly used methods for monitoring, prediction, and assessment; b. have general understanding of commonly used control technologies for reducing air and noise pollution; c. work as an entry-level staff in the air and noise pollution profession; d. have the basic ability to analyze data and issue in a logical way. e. recongize the need for and engage in life-long learning.
Subject Synopsis/ Indicative Syllabus	**Air Pollution Studies** 1. <u>Chemical and physical characteristics of the atmosphere</u> Sources and sink of main air pollutants in the atmosphere; meteorological parameters affecting the concentrations of air pollutants. 2. <u>Measurement and analysis of ambient air pollutants</u> Methods and techniques for the measurement and analysis of ambient gaseous pollutants, particulate pollutants, and odor pollutants in the environment. 3. <u>Source sampling and pollution analysis</u> Source sampling criteria, method of measurement and analysis for gaseous pollutants, particulate pollutants, and odor pollutants from the sources. 4. <u>Air pollution dispersion modelling</u> Application of Gaussian Dispersion Models, transport of air pollutants and atmospheric stability, wind profile, factors affecting pollution dispersion in the atmosphere. 5. <u>Stationary and mobile sources of air pollutants and their control</u> Control devices of gas- and particle-phase pollutants from stationary sources; control methods of gas- and particle-phase pollutants from mobile sources. **Noise Pollution Studies**

	1. Environmental Noise Prediction Geometric spreading of sound from simple sources. Outdoor sound propagation. Effects of meteorological conditions - sound refraction and sound ray equations, air absorption. Sound radiation near boundary, ground absorption, ground/facade reflection. Sound diffraction around obstacles. 2. Noise Assessment Need for noise impact assessment. Basic principles - baseline study, noise prediction, monitoring and evaluation. Background noise survey - instrumentation, approach and data analysis. Assessment criteria - local and international codes. 3. Road Traffic Noise Vehicle noise - sources, emission limits. Traffic noise - characteristics, propagation. Computer prediction methods. Noise criteria. Methods of noise control - land use, road design, traffic measures, barrier, enclosure and others. 4. Railbound Traffic Noise Train noise and railway noise, Wayside noise and vibration, squealing noise. Noise sources and control technology. Noise prediction methodology. 5. Construction Noise Major noise sources. Noise prediction - stationary and moving sources. Regulatory standard, work permits. Engineering and management control. 6. Laboratory Works (a) Noise Barrier (b) Industrial Noise Measurement
Teaching/Learning Methodology	In lectures students will be presented with an overview of the nature of air and noise pollution. They will also be taught the knowledge required to predict and assess air and noise pollution impact and to make recommendations for solution. The lecture will be keynote in nature, and students will be encouraged to read pre-assigned references. Laboratory sessions will involve familiarization with the relevant basic measuring instruments. Tutorials will be used to discuss readings, assignments and laboratory reports.

Assessment Methods in Alignment with Intended Learning Outcomes

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed				
		a	b	c	d	e
1. Homework, quizzes, in-class problems and lab report	30	√	√	√	√	√
2. Final examination	70	√	√	√	√	
Total	100					

Students must attain at least grade D in both coursework and final examination (whenever applicable) in order to attain a passing grade in the overall result.

Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes:

Homework – To help students further understand what they learnt in the lectures.

Quiz –To test if students have grasped the underlying ideas.

In-class problem - During class periods, students will sometimes be asked to work a problem in a group or individually. These problems are designed to help students learn to utilize the concepts discussed in the reading material and covered in the quiz.

Lab experiment – It will provide students first-hand experience in understanding the sources, analysis and control of air pollutants and noise. Students are required to carry out experiments under the supervision of lecturers and lab technicians.

Seminar – It will help students for exploring their views in relevant areas.

Final examination - The exam tests student's ability to utilize the concepts covered in this course.

		Average hours per week
Student Study Effort Expected	Class contact:	
	▪ Lectures/ Tutorials/ Laboratory	3 Hrs.
	Other student study effort:	

	▪ Completion of assignments and lab reports	3 Hrs.
	▪ Self Study	3 Hrs.
	Total student study effort	9 Hrs.
Reading List and References	Daniel A. Vallero, *Fundamentals of Air Pollution (5th Edition)*, Academic Press, Elsevier, 2014. Jian Kang, *Urban Sound Environment*, Taylor & Francis, 2007. Julian B. Olishifski, Earl R. Harford, *Industrial Noise and Hearing Conservation*, National Safety Council, c1975. Noel De Nevers, *Air Pollution Control Engineering*, McGraw Hill, 2000. Peter Brimblecombe, *Air Pollution Reviews – Vol. 6: Air Pollution Episodes*, London: World Scientific Publishing Europe Ltd., 2018. Randall F. Barron, *Industrial Noise Control and Acoustics*, CRC Press, Inc. 2002. Thad Godish, *Air Quality*, 4th edition, Lewis Publishers, 2004. Peters, R.J. et al., *Acoustics and Noise Control*, London: Routledge, 2013.	