Subject Description Form

Subject Code	CSE30331
Subject Title	Air and Noise Pollution Studies for Civil Engineering
Credit Value	3
Level	3
Exclusions	CSE331 Air and Noise Pollution Studies or CSE336 Air and Noise Pollution Studies or CSE20331 Air and Noise Pollution Studies for ESD
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. Able to 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.
Subject Synopsis/ Indicative Syllabus	Air Pollution Studies 1. Chemical and physical characteristics of the atmosphere (part I) Physical structure and optical characteristics of the atmosphere; Chemical compositions of air pollution; 2. Chemical and physical characteristics of the atmosphere (part II) Photochemical smog; Halogenated hydrocarbons; Airborne particulate matters. 3. Atmospheric dispersion and transport Concepts of atmospheric dispersion and transport; Factors affecting atmospheric dispersion and transport; Gaussian Plume Equation. 4. Air quality monitoring and emissions assessment Methods of air quality monitoring and considerations; Data collection and quality control; Air pollution index; Emission factors and rates of air pollutants. 5. Air pollution control Control devices of gas- and particle-phase pollutants from stationary sources; Control methods of gas- and particle-phase pollutants from mobile sources. 6. Indoor air pollution Main indoor air pollutants; Factors affecting indoor air quality; Sources and transformations of indoor air pollutants. 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.

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<tr><td></td><td>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</td></tr>
<tr><td>Teaching/Learning Methodology</td><td>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.</td></tr>
<tr><td>Assessment Methods in Alignment with Intended Learning Outcomes</td><td>
<table>
<tr><td rowspan="2">Specific assessment methods/tasks</td><td rowspan="2">% weighting</td><td colspan="4">Intended subject learning outcomes to be assessed (Please tick as appropriate)</td></tr>
<tr><td>a</td><td>b</td><td>c</td><td>d</td></tr>
<tr><td>1. Homework, quizzes, in-class problems and lab report</td><td>30</td><td>√</td><td>√</td><td>√</td><td>√</td></tr>
<tr><td>2. Final examination</td><td>70</td><td>√</td><td>√</td><td>√</td><td>√</td></tr>
<tr><td>Total</td><td>100 %</td><td colspan="4"></td></tr>
</table>
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.</td></tr>
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<tr><td></td><td colspan="2">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.

Final examination - The exam tests student's ability to utilize the concepts covered in this course.</td></tr>
<tr><td rowspan="6">Student Study Effort Expected</td><td>Class contact:</td><td>Average hours per week</td></tr>
<tr><td>▪ Lectures / Tutorials / Laboratory</td><td>3 Hrs.</td></tr>
<tr><td>Other student study effort:</td><td></td></tr>
<tr><td>▪ Completion of assignments and lab reports</td><td>3 Hrs.</td></tr>
<tr><td>▪ Self Study</td><td>3 Hrs.</td></tr>
<tr><td>Total student study effort</td><td>9 Hrs.</td></tr>
<tr><td>Reading List and References</td><td colspan="2">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.</td></tr>
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