

PRE-REQUISITE: ENSC-107**COURSE LEARNING OUTCOMES**

- The purpose of this course is to give the students an overview of air and noise pollution.
- This course will provide an understanding of the sources and effects of air pollutants
- The students will have the knowledge about main causes and reasons of the air and noise pollution.
- The students will be able to answer why air pollution should be controlled.
- The students are expected to be familiar with methods for prevention, control, measures and management of the pollution.

CONTENTS**Unit-I: Introduction to air pollution**

- 1.1. History of air pollution? Where, why and when?
- 1.2. Sources of air pollution
- 1.3. Types of air pollutants and pollution
- 1.4. Air emission estimates and measurements
- 1.5. Transport of pollutants
- 1.6. Air pollution Models/ Gaussian Plume Model
- 1.7. Effects of air pollution on Environment/Human health

Unit-II: Laws, regulations and control philosophies regarding air pollution

- 2.1. Air pollution laws and regulations around globe
- 2.2. Air quality guidelines
- 2.3. Air pollution rules and regulations in Pakistan
- 2.4. Air pollution control philosophies

Unit-III: Air pollution control

- 3.1. Organizations for air pollution control
- 3.2. Engineering control of air pollution
- 3.3. Air pollution control by devices
- 3.4. Control devices for particulates
- 3.5. Control devices for liquid or mist
- 3.6. Control devices for gaseous contaminants

Unit-IV: Specified control devices for selected air pollutants

- 4.1. Sulfur oxides (SO_x) control
- 4.2. Nitrogen oxides (NO_x) control
- 4.3. Carbon monoxide (CO) control
- 4.4. Carbon dioxide (CO₂) control
- 4.5. Hg, Dioxins and Furans control

Unit-V: Indoor air pollution

- 5.1. Sources
- 5.2. Transportation/Movement
- 5.3. Specific Health Effects
- 5.4. Control of indoor air pollution

Unit-VI: Noise pollution

- 1.1. Introduction, characteristics and kinds of noise
- 1.2. Introduction to noise pollution
- 1.3. Sources of noise pollution/man made noise
- 1.4. Health effects of noise pollution
- 1.5. Overview of laws and regulations of noise

1.6. Mitigation and control techniques of noise pollution

TEACHING – LEARNING STRATEGIES

- Lecture based examination
- Presentation/seminars
- Class discussion
- Quizzes

ASSIGNMENTS – TYPE AND NUMBER WITH CALENDAR

It is continuous assessment. The weightage of assignments will be 25% before and after midterm assessment. It includes:

- Classroom participation,
- Class assignments
- Attendance, assignments and presentation,
- Attitude and behavior,
- Hands-on-activities,
- Short tests, quizzes etc.

ASSESSMENT AND EXAMINATIONS:

Sr. No.	Elements	Weightage	Details
1.	Mid Term Assessment	35%	It takes place at the mid-point of the semester
2.	Formative Assessment	25%	It is continuous assessment. It includes: classroom participation, attendance, assignments and presentation, class assignments, attitude and behavior, hands-on-activities, short tests and quizzes etc.
3.	Final Assessment	40%	It takes place at the end of the semester. It is mostly in the form of a test, but owing to the nature of the course the teacher may assess their students based on term paper, research proposal development, field work and report writing etc.

RECOMMENDED TEXT BOOKS / SUGGESTED READINGS

1. Boubel, R. W., Vallero, D., Fox, D. L., Turner, B., & Stern, A. C. (2013). *Fundamentals of Air Pollution*: Elsevier Science.
2. Bragdon, C. R. (2016). *Noise Pollution: The Unquiet Crisis*: University of Pennsylvania Press, Incorporated.
3. Kutz, M. (2018). *Handbook of Environmental Engineering*: Wiley.
4. Sánchez-Triana, E., Enriquez, S., Afzal, J., Nakagawa, A., & Khan, A. S. (2014). *Cleaning Pakistan's Air: Policy Options to Address the Cost of Outdoor Air Pollution*: World Bank Publications.
5. Saxena, P., & Naik, V. (2018). *Air Pollution: Sources, Impacts and Controls*: CAB International.
6. Templeton, N. (2017). *Noise Pollution and Control*: Larsen and Keller Education.
7. Tiwary, A., & Williams, I. (2018). *Air pollution: measurement, modelling and mitigation*: CRC Press.
8. Wang, L. K., & Pereira, N. C. (2012). *Air and Noise Pollution Control*: Volume 1: Humana Press.
9. Yerramilli, A. (2019). *Air Pollution: Prevention and Control Technologies*: BS Publications.

ENS-208: AIR AND NOISE POLLUTION (PRACTICAL) (01 Credit hrs)

PRE-REQUISITE: ENSC-107

LEARNING OUTCOMES:

- This course will provide a demonstration about the different instruments used for monitoring air pollution.
- This course will provide a demonstration about the different instruments used for monitoring noise pollution.
- The students will learn about the practical aspects of noise survey.
- They will become conversant with the different methods to conduct monitoring and survey.

CONTENTS

Unit-1: Practical-1

- 1.1. Monitoring of ambient air pollution

Unit-II: Practical-2

- 2.1. Monitoring of ambient particulate matter

Unit-III: Practical-3

- 3.1. Stack monitoring
- 3.2. Vehicle exhaust monitoring.

Unit-IV: Practical-4

- 4.1. Monitoring of indoor air pollution

Unit-V Practical-5

- 5.1. Monitoring of sound pressure and sound levels.
- 5.2. Monitoring of traffic noise.
- 5.3. Measurement of reverberation time.
- 5.4. Measurement of sound absorption of materials.

Unit-VI Practical-6

- 1.1. Industrial noise survey

TEACHING – LEARNING STRATEGIES

- Lecture based examination
- Presentation/seminars
- Class discussion
- Quizzes

ASSIGNMENTS – TYPE AND NUMBER WITH CALENDAR

It is continuous assessment. The weightage of Assignments will be 25% before and after midterm assessment. It includes:

- classroom participation,
- attendance, practical performance, assignments
- attitude and behavior,
- hands-on-activities,
- short tests, quizzes etc.

ASSESSMENT AND EXAMINATIONS:

Sr. No.	Elements	Weightage	Details
1.	Mid Term Assessment	35%	It takes place at the mid-point of the semester
2.	Formative Assessment	25%	It is continuous assessment. It includes: classroom participation, attendance, assignments and presentation, performance, homework, attitude and behavior, hands-on-activities, short tests, quizzes etc.
3.	Final Assessment	40%	It takes place at the end of the semester. It is mostly in the form of a test, but owing to the nature of the course the teacher may assess their students based on term paper, research proposal development, field work and report writing etc.

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1. Wang, L. K., & Pereira, N. C. (2012). *Air and Noise Pollution Control: Volume 1: Humana Press.*
2. Yerramilli, A. (2019). *Air Pollution: Prevention and Control Technologies: BS Publications.*
3. How to Monitor? – Monitoring Methods/Ministry of environment/
(<https://www.mfe.govt.nz/publications/air/good-practice-guide-air-quality-monitoring-and-data-management-2009/4-how-monitor-->)
4. STRATEGIES FOR NOISE SURVEYS
(https://www.who.int/occupational_health/publications/noise7.pdf)