

Welcome to ES200 !

ES 200

(First) Half Semester

Professor Munish Chandel*

Professor Harish Phuleria

Professor Amritanshu Shriwastav

CESE

* Instructor In-Charge

THREE Modules

- **Module A : Solid Waste Management and Climate Change**
 - 34% (14QZ+20FNL)
- **Module B : Air Quality**
 - 33%
- **Module C : Anthropogenic Effects on Ecosystem; Water Quality & Health, Water & Wastewater Treatment**
 - 33%

Final Exam

- During **Mid-Sem** Exam Week as per Institute Schedule

Attendance

Mode of Attendance

- Slip of paper as you enter the Hall
 - Name
 - Roll Number
- Return on exit at the end of the lecture

Any Questions?
Clarifications ?

Brief Introductions to the Three Modules

Module-C

Anthropogenic effects on ecosystem, water quality & health, water & wastewater treatment

Contents

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Lecture-1

Ecosystem & Biodiversity

- ❖ Definition and examples of ecosystem
- ❖ Important concepts and contributors in an ecosystem
- ❖ Biodiversity: concept & importance
- ❖ Biodiversity hotspots in India/World
- ❖ Conservation of biodiversity

Lecture-2

Water Resources

- ❖ Why is water so important?
- ❖ Hydrologic cycle
- ❖ Major water compartments
- ❖ Major water issues
- ❖ Water management

Lecture-3

Water Quality & Pollution Sources

- ❖ Concept of water quality and human health
- ❖ Major water pollutants & their effects
- ❖ Toxicity and risk assessment
- ❖ Point & non-point sources of pollution

Lecture-4

Parameters for Water Quality Characteristics, and Standards

- ❖ Key parameters for water quality characteristics
Physical/Chemical/Biological
- ❖ Concepts of BOD, COD, DO sag curve, pathogens, MPN etc.
- ❖ Standards for water quality by different agencies
- ❖ Quiz

Lecture-5

Conventional Surface Water Treatment System

- ❖ Water collection
- ❖ Water treatment
- ❖ Water distribution

Lecture-6

Conventional Municipal

Wastewater Treatment System

- ❖ Conventional municipal wastewater collection, treatment, and discharge

Lecture-7

Alternate Water & Wastewater Treatment

- ❖ Membrane Filtration
- ❖ High Rate Algal Pond (HRAP)
- ❖ Advanced Integrated Wastewater Pond System (AIWPS)
- ❖ Photobioreactor
- ❖ Solar Disinfection (SODIS)

Text/References

- ❖ Masters, G.M., Ela, W.P. (2008) Introduction to Environmental Engineering and Science, 3rd edition, PHI Learning Pvt. Ltd. Delhi.
- ❖ Cunningham W.P., Cunningham M.A. (2002) Principles of Environmental Science, 4th edition, Tata McGraw-Hill Publishing Company Ltd. New Delhi.
- ❖ Miller, G.T.J. (2005) Essentials of Ecology, 3rd edition, Thomson Learning Inc.
- ❖ Arceivala, S.J., Asolekar, S.R. (2007) Wastewater Treatment for Pollution Control and Reuse, 3rd edition, Tata McGraw-Hill Publishing Company Ltd. New Delhi.
- ❖ Other texts and references

Evaluation

- ❖ 1 Quiz (13 Marks)
- ❖ 1 End Semester Exam (20 Marks)

- ❖ Module C – 33% weightage towards final grades

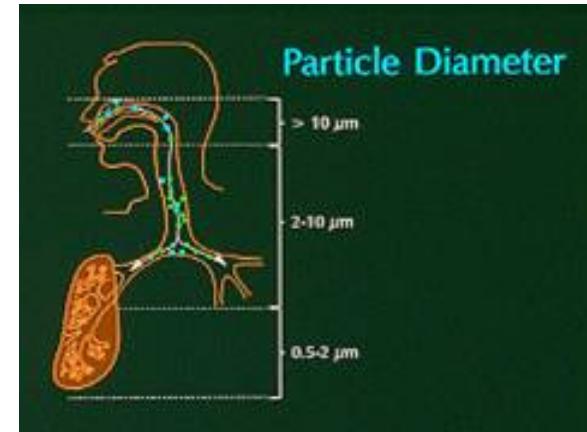
Module B

Air Quality

Module B:

Air Quality

Sources, Distribution, Impacts,
Monitoring, Modeling, Control



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Goal !

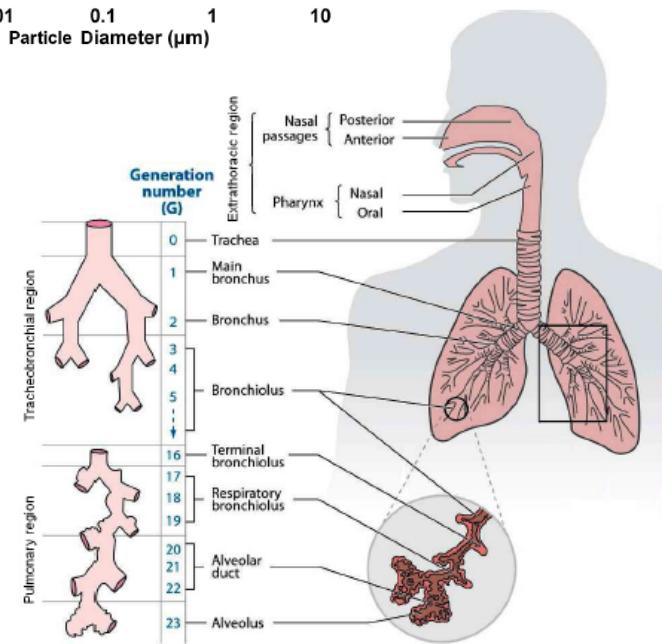
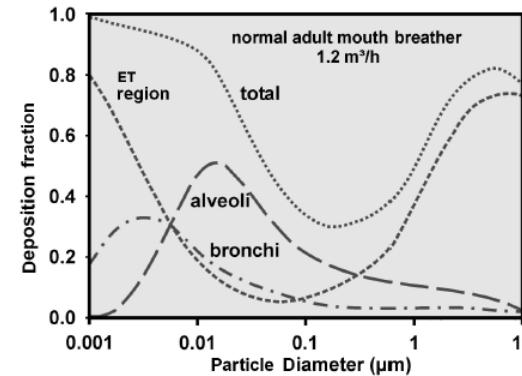
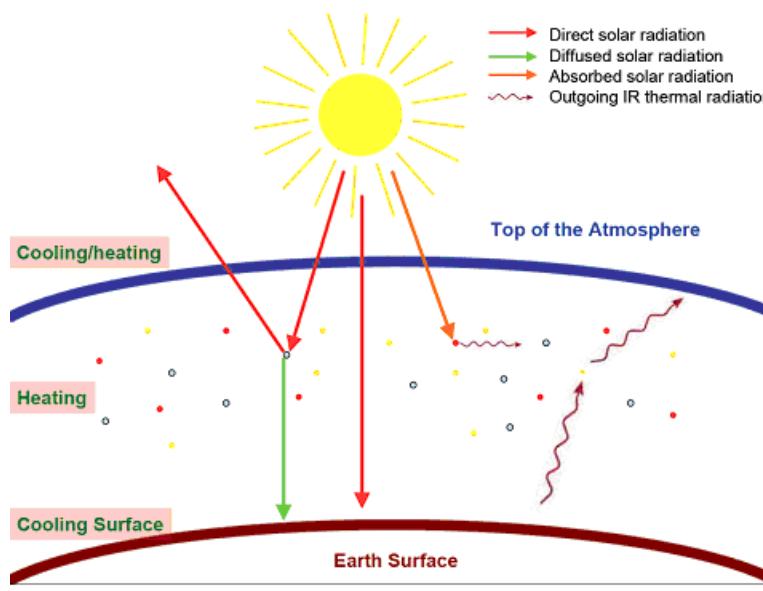
You will be able to explain key concepts of air pollution and air quality management

Expectation:

- To memorize key concepts and definitions
- To describe physico-chemical phenomena, and
- To apply the understanding on current air quality problems

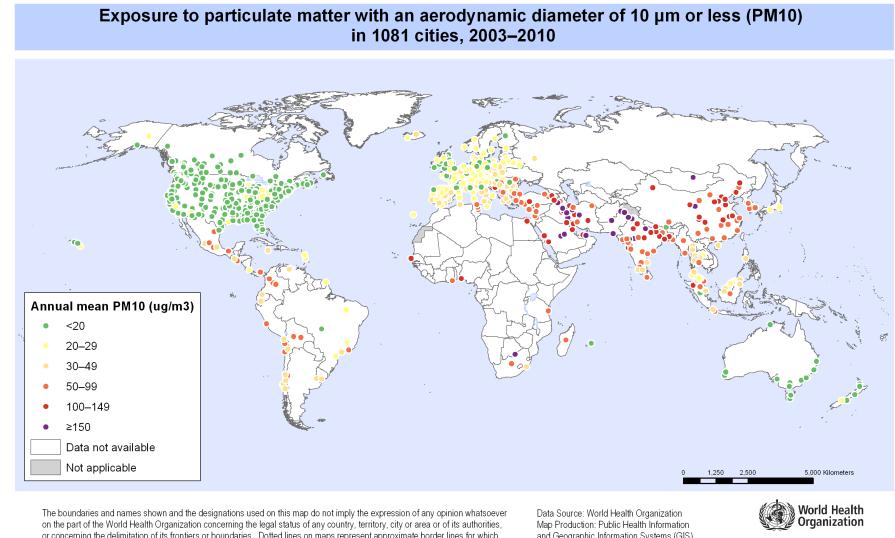
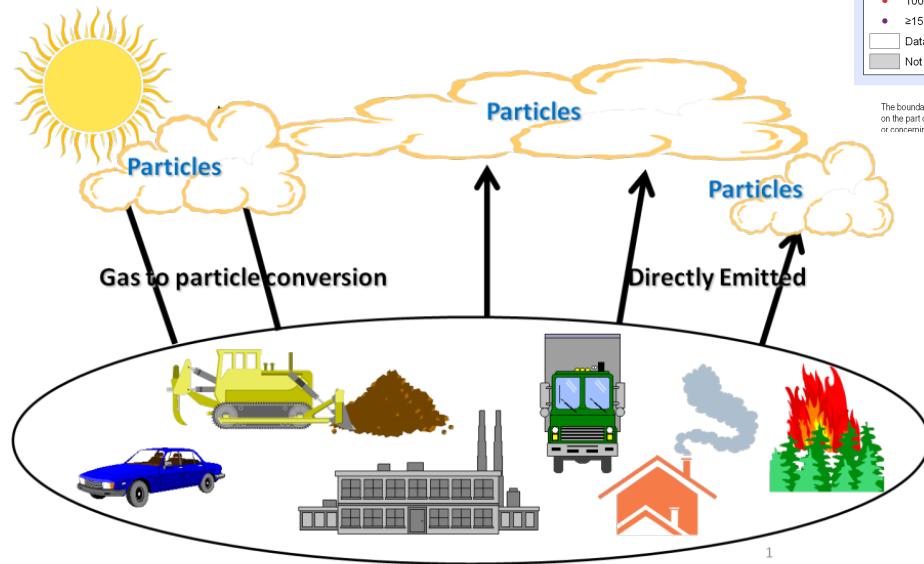
Learning Objectives !

1. To learn about the criteria air pollutants, air quality regulations, and their impact on human health and climate



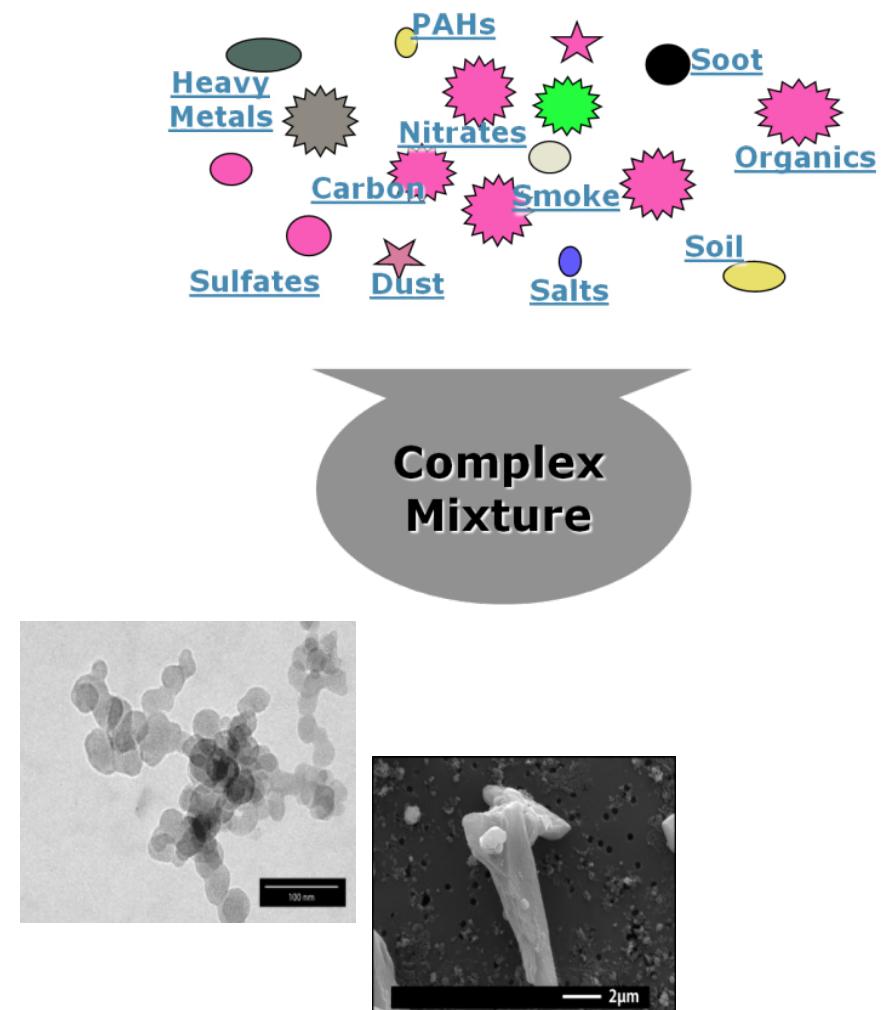
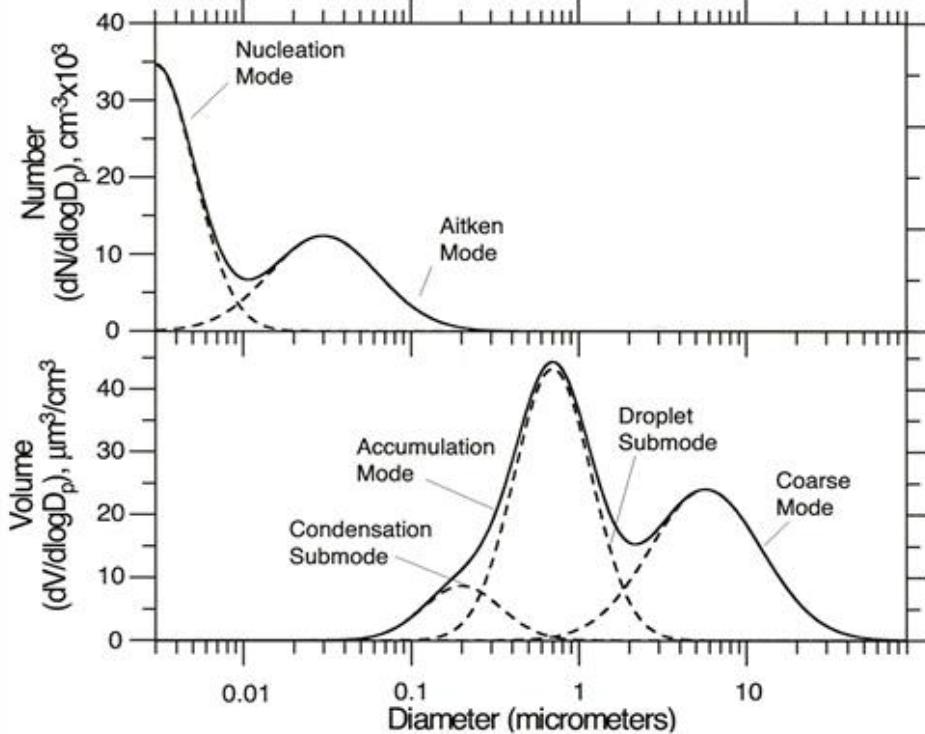
Learning Objectives !

2. To understand sources of air pollutants & their spatial and temporal variability



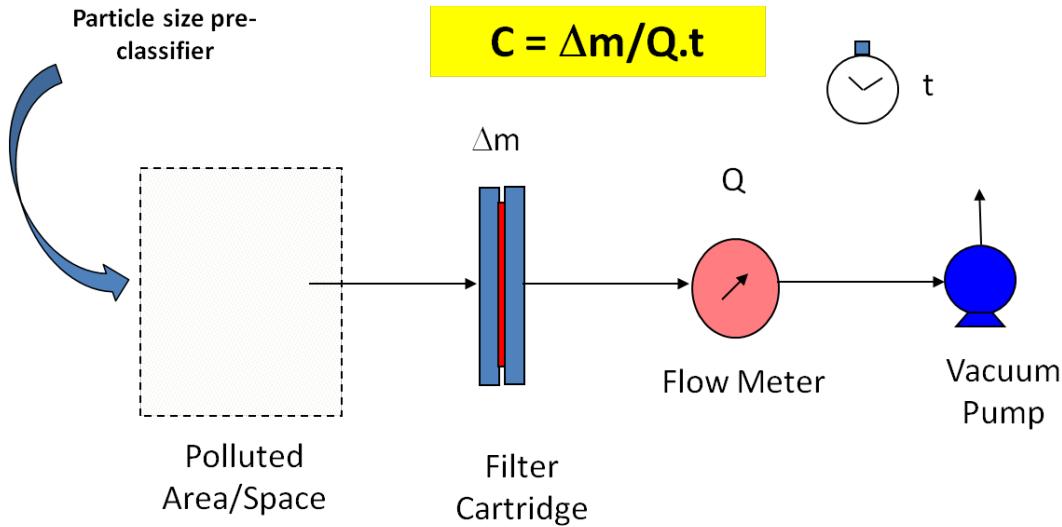
Learning Objectives !

3. To understand particle composition & size distribution



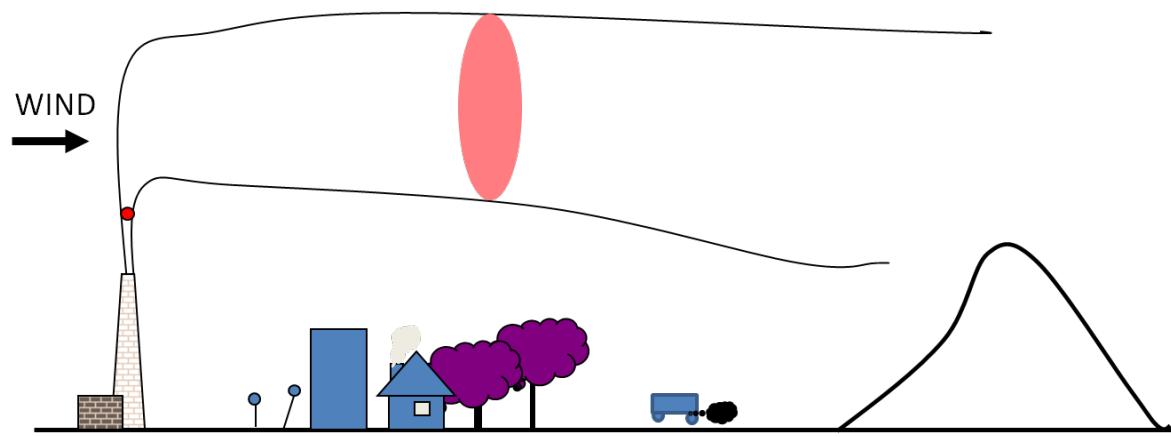
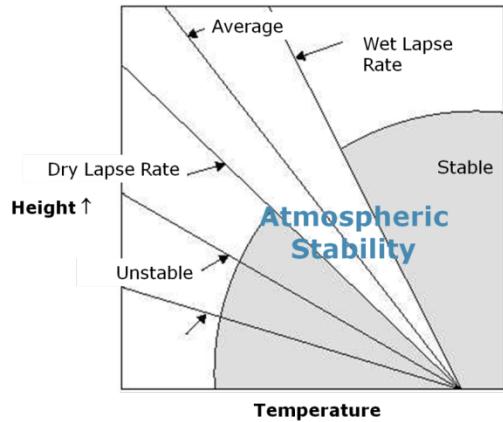
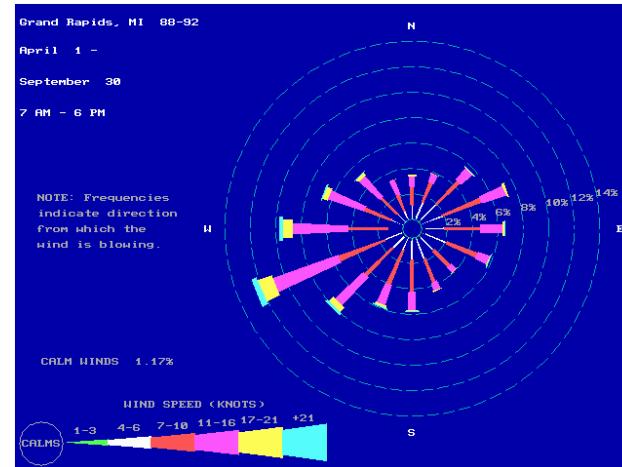
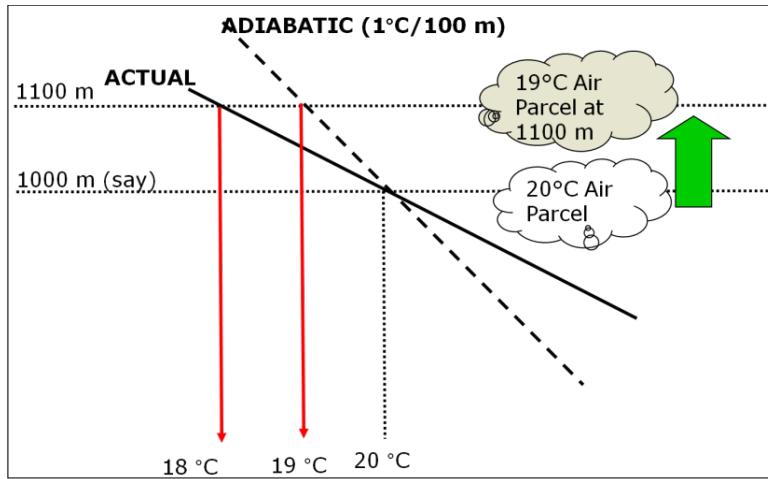
Learning Objectives !

4. To learn about monitoring methods and thus able to quantify pollutants' concentrations



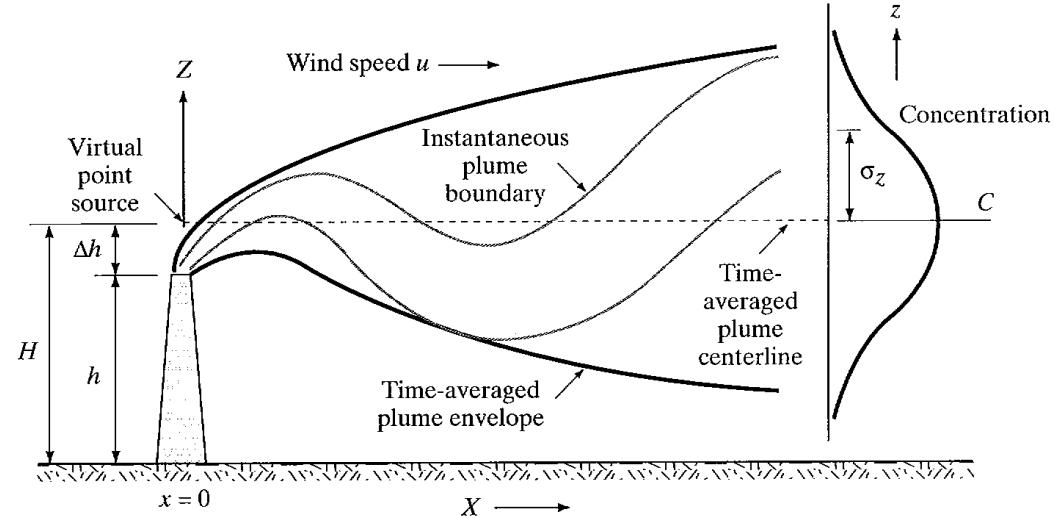
Learning Objectives !

5. To explain effects of meteorology and the physics of dispersion of pollutants in the atmosphere

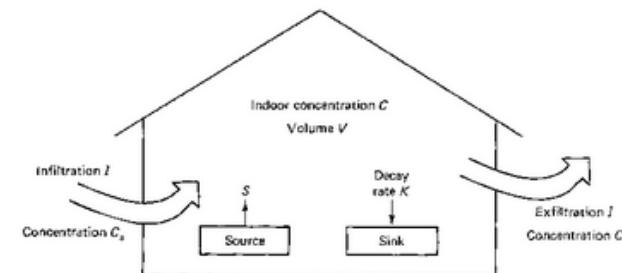


Learning Objectives !

6. To learn about air quality modeling methods



$$C(x, y, 0) = \left[\frac{Q}{\pi \sigma_y \sigma_z u_H} \right] \left[\exp \left[-\frac{1}{2} \left(\frac{y}{S_y} \right)^2 \right] \right] \left[\exp \left[-\frac{1}{2} \left(\frac{H}{S_z} \right)^2 \right] \right]$$



accumulation rate = input rate +sources - output rate - decay

$$V \frac{dC}{dt} = S + C_a/V - CIV - KCV$$

Learning Objectives !

7. To learn about air pollution control methods from mobile and stationary sources

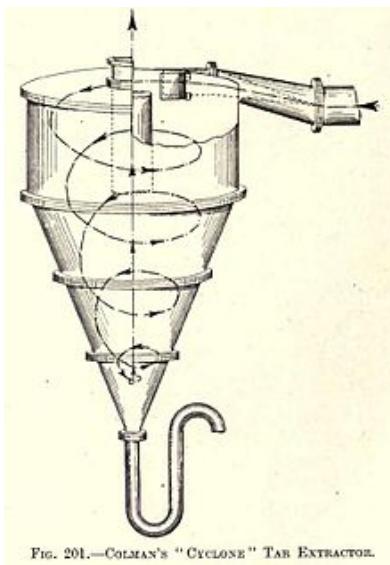
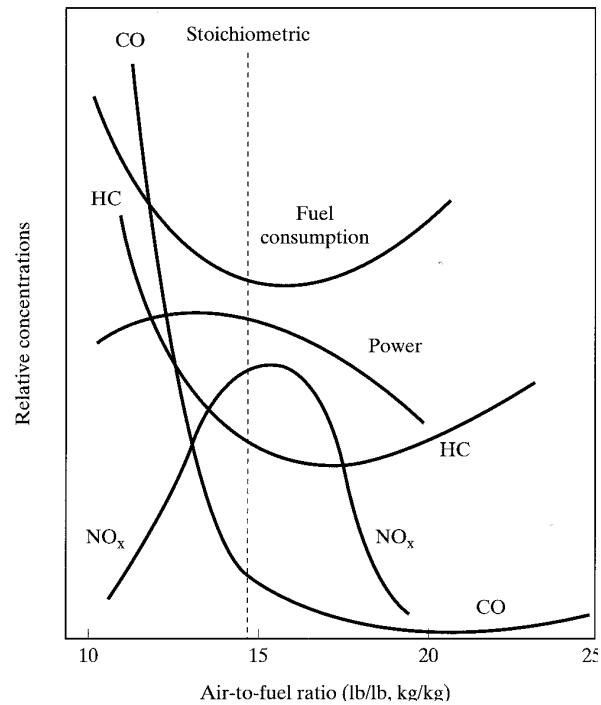
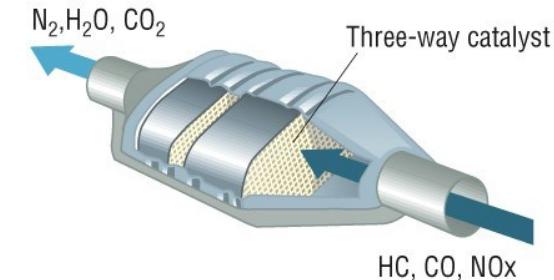
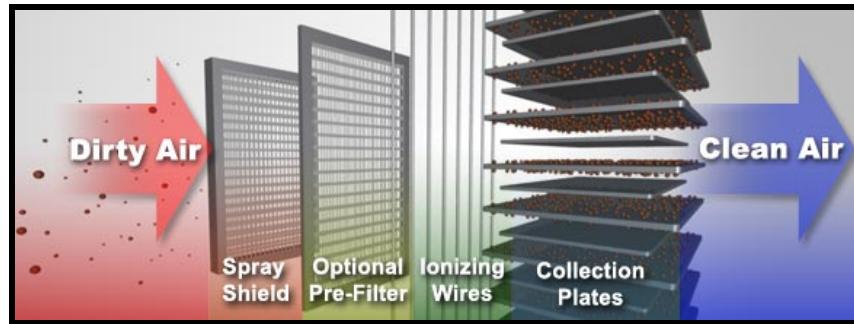


FIG. 201.—COLMAN'S "CYCLONE" TAR EXTRACTOR.



Evaluation !!!

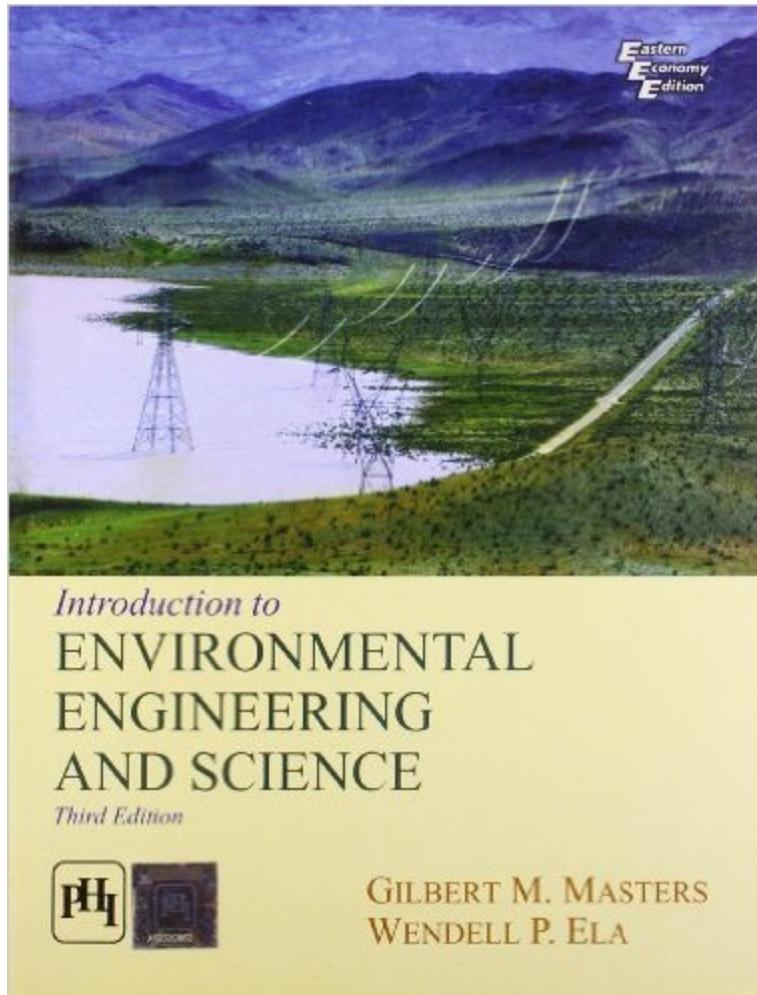
When:

- This module will start from 7.Aug.2017
- There will be a total of seven lectures

Evaluation:

- Final Exam – 60%
- Quiz – 40%

Textbook



**Will provide relevant
articles or chapters from
other books, as necessary**

Module A

Solid Waste Management and Climate Change

Solid Waste Management and Climate Change

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Solid Waste Management and Climate Change

- Description :**

First part: Different aspects of municipal solid and biomedical waste management.

Second part: Climate change and greenhouse gas emissions, and how different technologies could reduce greenhouse gas emissions.

- Goal:**

To help students develop basic understanding of solid and biomedical waste management, and the climate change and its possible causes.

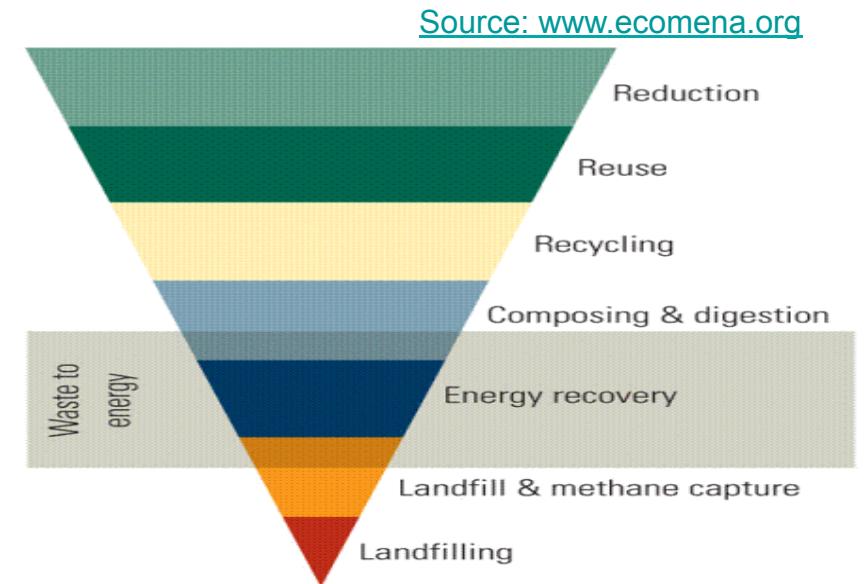
Solid Waste Management and Climate Change

- **Text/References:**

- Introduction to Environmental Engineering and Science, 3rd edition, Gilbert M. Masters, Wendell P Ela. PHI Learning Private Limited, New Delhi, 2010.
- Environmental Engineering. Howard S. Peavy, Donald R. Rowe, George Tchobanoglous McGraw-Hill International Edition, 1985
- EPA website: <http://www.epa.gov/osw/hazard/>
- CPCB website: <http://www.cpcb.nic.in/index.php>



[Source: www.dbstephens.com](http://www.dbstephens.com)



Environmental hierarchy for solid waste management

[Source: narasimhans34.com](http://narasimhans34.com)





[Source: www.greenretreat.org](http://www.greenretreat.org)



www.fanpop.com



[Source: www.scgh.com](http://www.scgh.com)

What is Green Technology

