

## **Science International degree @ Mahidol (SIM)**

**Course Name : Air Quality Monitoring and Management**

**SCBE 322 3 (2-3-5)**

**Lecture : Thu (09:30 - 11:30)**

**Lab : Thu (13.00 - 16.00)**

**Semester : Semester II 2020**

**Course Coordinator:** Dr. Toemthip Poolpak

**Instructors:** Dr. Toemthip Poolpak (TP) Email: toemthip.poo@mahidol.edu

**Teaching assistance:** Kwang Mo Yang (MY)

### **Course Description**

Air pollution is of public health concern and big environmental issue on a global scale. Indoor air pollutants result from products used in construction materials, the generation ventilation system may cause microscale air problem. Industrial and mobile sources that contaminate the ambient air may contribute to mesoscale pollution. Macroscale effects include ambient air pollutants in mesoscale transportation over a large distance. Global air pollution effects include acid rain, ozone pollution and climate change. Air quality standard and control and also Clean Air Act are the comprehensive federal law that regulates air emissions from stationary and mobile sources. Additionally, several engineering systems are developed for air treatment and other purposes.

### **Course learning outcomes**

After completing the course, students should be able to:

1. Understand sources, mechanisms and chemical reaction of major air pollutants.
2. Understand the health and environmental consequence of polluted air.
3. Understand the air regulation and can apply the broad principle of chemical composition to select technique for control.
4. Produce and analyze data, interpret the information, and effectively communicate in both Thai and English the results of analysis.
5. Design experiment or field-works with knowledge in general characteristics and properties of chemical compounds.

## Grading and evaluations

Grading for the SCBE322 course is based on several pieces of works. These include class attendance, assignments and laboratory reports, midterm and final exams, a general evaluation from the lecturing staff. Work schedule for laboratory will be depend on the situation.

1. Mid-term examination	30%
2. Final examination	30%
3. Attendance and assignments	10%
4. Laboratory attendance and reports	20%
4. Presentation (or Fieldtrip)	10%

Students will be evaluated from their total score (out of 100%). Grading system is A, B+, B, C+, C, D+, D and F.

## Course Outline

Class is on Thursday 09.30 - 16.00 at Faculty of Science, Phayathai Campus

### Lecture: R503      09.39-11.30

Date	Month	Topics	instructor
21	Jan	Introduction to air pollution: structure of the atmosphere and atmospheric process	TP
28	Jan	Earth's climate system: global circulation and global change	TP
4	Feb	Ozone and greenhouse gases: ground level ozone formation and ozone depletion; greenhouse gases	TP
11	Feb	Major air pollution: origin and fate I: CO, particulate matter, methane, halogen and volatile organic carbons	TP
18	Feb	Major air pollution: origin and fate II: nitrogen dioxide, sulfur dioxide, photochemical oxidants	TP
25	Feb	Micro air pollution: indoor air pollution	TP
4	Mar	Environmental and health consequences of polluted air: health effects and environmental impact	TP
11	Mar	Air quality standard: air quality standard and legislation; Clean Air Act	TP
<b>15-19</b>	Mar	<b>Midterm examination week</b>	TP
25	Mar	Ambient air quality and continuous emission monitoring: monitoring system; selection of instrumentation and methods	TP

1	Apr	Air quality control and management I: collection device	TP
8	Apr	Air quality control and management II: Treatment of emission: control of particulate matter and gaseous pollutants	TP
22	Apr	Air quality control and management III: Control of moving sources: engine fundamental and electric vehicles	TP
29	Apr	Air quality control and management IV: Biological treatments: bioscrubber and biotrickling filter	TP
6	May	Field trip	TP
<b>10-21</b>	<b>May</b>	<b>Final Examination Week</b>	TP

**Lab: B413/7 13.00-16.00**

<b>Date</b>	<b>Month</b>	<b>Topics</b>	<b>instructor</b>
21	Jan	Laboratory safety	TP, MY
4	Feb	Air quality	TP, MY
11	Feb	Greenhouse effects	TP, MY
18	Feb	Carbon dioxide and oxygen	TP, MY
4	Mar	Particulate matter I: Indoor, Outdoor	TP, MY
<b>15-19</b>	Mar	<b>Midterm examination week</b>	
25	March	Acid rain: Cause and Effects I	TP, MY
1	Apr		
8, 22	Apr	Acid rain: Effects II	TP, MY
29	Apr	Project presentation	TP, MY
<b>10-21</b>	<b>May</b>	<b>Final Examination Week</b>	

**References**

- Davis M and Masten SJ. 2020. Principles of Environmental Engineering and Science, 4<sup>th</sup> eds. McGrawHill, NY.
- Schnelle KB, Dunn RF, Ternes ME. 2016. Air pollution control and handbook, 2<sup>nd</sup> eds. CRC Press, FL.
- Vesilind PA, Morgan SM, Heine LG. 2004. Introduction to Environmental Engineering, 3<sup>rd</sup> eds. Cengage Learning, CT.