Course no.	457.210A	Class no.	001	Class name	Environmental Engineering	Credit	3

Instructor				
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Office hours: Mon 5:00-6:00 / 35-307				

1. Goals

This class discusses various environmental problems that affect human life and ecological soundness. The class deals with causes, effects, and solutions for local concerns of environmental destruction and pollution as well as global environmental concerns, and seeks for solutions and strategies for sustainable development.

2. Texts and references

1. Lecture notes
2. Davis, M. L. and Masten, S. J. (2014) Principles of Environmental Engineering and Science, 3rd ed. McGraw-Hill

3. Evaluation

Attendance	Assignment	Mid-term	Final	Class participation			Total
10%	20%	30%	30%	10%			100%

4. Lecture plan

Week	Lecture contents
1	Introduction to environmental engineering / Basic chemistry concepts I
2	Basic chemistry concepts II
3	Basic biology concepts / Materials balances / Reactors I
4	Reactors II / Ecosystems
5	Risk perception, assessment and management
6	Hydrology
7	Water quality management
8	Review / Midterm
9	Water treatment
10	Wastewater treatment
11	Air pollution I & II
12	Solid waste management / Hazardous waste management I
13	Hazardous waste management II / Noise pollution
14	Current issues and future perspectives / Review
15	Final

5. Guideline for students

6. Policy for plagiarism

80% of the lowest score of the class for every event

Introduction

Environmental engineering

- Office hour: Mon 5:00 – 6:00pm, 35-307
- Email: ychoi81@snu.ac.kr
- Course material/textbook:

  1. Lecture notes

  2. Davis & Masten (2014) Principles of Environmental Engineering and Science, 3rd ed.

- TA: Jihyeun Jung (정지현), dauky201@snu.ac.kr

Course objectives

- General background on environmental science and engineering
- Understand principles of environmental science
- Understand causes, effects, and engineering solutions for environmental problems
- Local to global scale
- Water, air, soil, waste, noise, …

Evaluation

- Homework assignments [20%]
  Midterm [30%], final [30%]
  Attendance, etc. [20%]

- Plagiarism & cheating: 80% of the class low

Environmental engineering

Environmental engineering is manifest by sound engineering thought and practice in the solution of problems of environmental sanitation, notably in

i) the provision of safe, palatable, and ample public water supplies,

ii) The proper disposal of or recycle of wastewater and solid wastes,

iii) The adequate drainage of urban and rural areas for proper sanitation, and

iv) The control of water, soil, and atmospheric pollution

and the social and environmental impact of these solutions.

(…)

(ASCE, 1977)

Environmental engineering

We will focus on principles of environmental chemistry and biology and their engineering applications that help improving human health and environmental soundness

Why Department of **Civil** and **Environmental** Engineering?

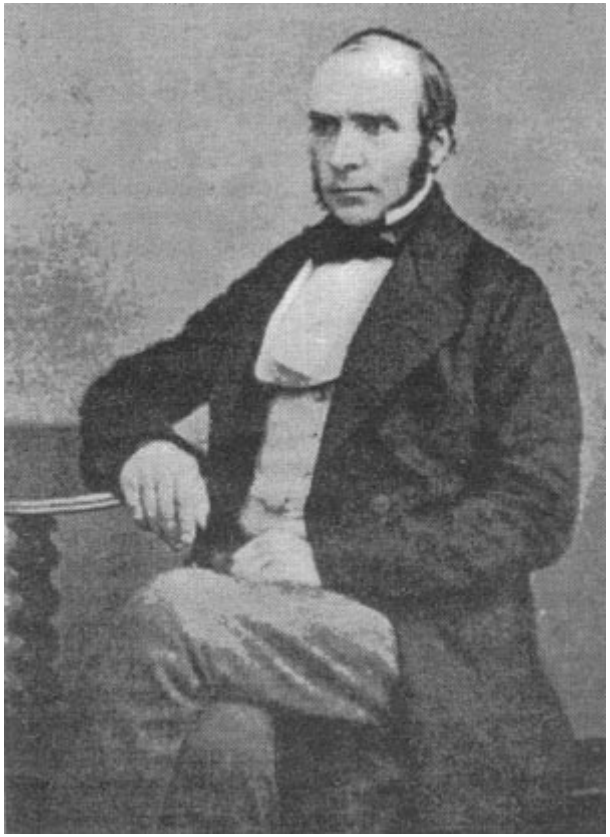
Environmental engineering

- It stems from civil engineering!
- Mid-1800s to mid-1900s: sanitary engineering (focused on providing safe drinking water)

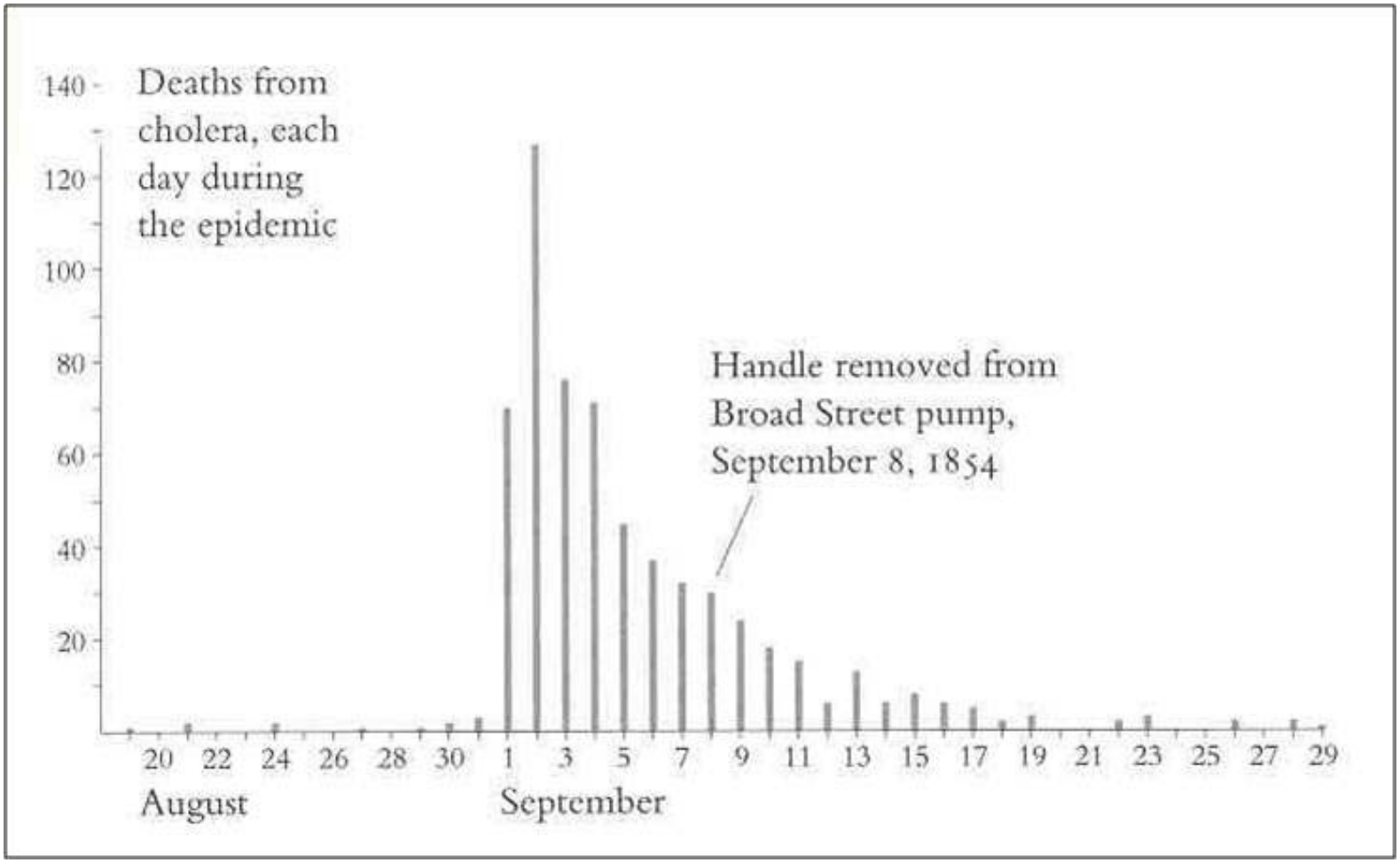
Roman waterway system

Pioneers of environmental sci. & eng.

- Dr. John Snow
  - Cholera outbreak in London (1853)
  - Tracked 83 victims: most of them obtained water from a hand pump located on Broad St.
  - Low incidence at a workhouse and the Lion Brewery: own water supply



Pioneers of environmental sci. & eng.



Environ. Eng. history in Korea

- Rapid economic growth since 1960
- Before 1980: most sewage and wastewater ran directly to rivers

Environ. Eng. history in Korea

- Nakdong-river phenol outbreak (1991)

1차 페놀오염은 1991년 3월 16일 경상북도 구미시 구포동에 있는 두산전자의 페놀원액 저장탱크에서 페놀수지 생산 공장으로 페놀원액을 공급하는 과정에서 평소 사용하던 지상 파이프가 고장나, 예비용 지하파이프를 사용 하던 중 연결부에서 파이프가 파열되어 30톤이 유출되었다. 페놀원액이 대구 상수원인 다사취수장으로 흘러듦으로써 수돗물을 오염시켰다. 수돗물에서 악취가 난다는 신고를 받은 취수장측은 원인 규명도 하지 않고 염소를 다량 투입하였다.

Environ. Eng. history in Korea

페놀은 염료나 수지를 만들 때 쓰이는 특유의 냄새를 지닌 유기물질이다. 페놀이 정수장에서 염소와 화학반응을 일으켜 만들어지는 클로로페놀은 페놀보다 악취가 훨씬 심하고, 농도 1ppm을 넘으면 암, 중추신경장애 등을 일으키는 물질이다. 오염된 정수장 물이 대구시 거의 모든 지역에 식수로 공급되어, 일부 주민들은 두통과 구토 증세를 보이기도 하였다. 2차 페놀오염은 두산전자가 다시 조업을 시작한지 5일 만인 4월 22일 발생하였다. 부실 보수공사로 인해 페놀탱크 이음새 부분이 파열되어 페놀원액이 다시 낙동강으로 유입되면서 대구지역에 식수공급이 중단되었다.

이 사고로 많은 피해보상과 자연유산, 임신중절 등을 하기도 하였으며, 두산그룹 회장이 물러나고, 환경처 장차관이 인책, 경질되었다. 취수장을 오염시킨 페놀은 낙동강을 타고 흘러 밀양, 함안, 부산, 마산을 포함한 영남 전 지역이 페놀 파동에 휩쓸리게 되었다.

이 사건을 계기로 음용수 검사항목의 문제가 본격적으로 제기 되었을 뿐 아니라 「환경범죄의 처벌에 관한 특별조치법」이 제정되었으며, 환경문제의 심각성에 대한 국민들의 경각심이 고조되었다.

(국가기록원, 2007)

Environ. Eng. history in Korea

- Almost nothing in 1970s to
  Full coverage in 2000s

	1991	1996	2001	2006	2011
하수도보급률 (%) %population linked to sewer treatment system	35.7	52.6	73.2	85.5	90.9
하수시설처리용량 (천톤/일) Sewage treatment capacity (10^3 ton/day)	5,258	11,452	19,230	23,273	25,228

e-나라지표, www.index.go.kr

Problem solved?

Reading assignments

- Textbook Ch1-1~4