Course title: Industrial pollution control

Course code: WSW 132	**No. of credits:** 3	**L-T-P distribution:** 28-14-0	**Learning hours:** 42

Pre-requisite of the course (if any): Must have taken the course on water supply and treatment

Department: Department of Regional Water Studies

Course coordinator(s): Dr. Arun Kansal	**Course instructor(s):** Dr. Arun Kansal
Contact details:	
Course type: Elective	**Course offered in:** Semester 3

Course Description

This is a specialise course to elucidate latest developments in water and wastewater management practices in diverse pollution sources including industries. Selected case studies are chosen to reinforce key concepts and issues. The course concludes with a brief discussion on pollution issues in small-scale industries and industrial estate planning.

Course objectives

The course introduces various concepts of water efficiency and waste minimization in industrial sectors. Characterization and classification of different types of wastes are discussed along with existing norms for waste disposal. Treatment methods of specific pollutant arising out of industrial process are explained.

Course content

Module	**Topics**	**L**	**T**	**P**
1	Introduction to waste production in different sectors such as domestic, industrial and agriculture sectors; Industrial symbiosis and estate planning, effluent/emission trading	4		
2	Waste minimization by reuse and recovery. Waste minimization by recovery and external sale of products, case studies	4	6	
3	Specific treatment methods- Design of equalization and neutralization tank, removal of oil and grease; fundamental of fluid flow and hydraulic profile diagram	5	8	
4	Industrial wastewater treatment processes: *Introduction*- magnitude of industrial pollution, their characteristics, and impacts; selection procedure for physical, chemical and biological methods of industrial wastewater treatment *Case studies*- Manufacturing process description; pollution sources, waste reduction and treatment methods for industries- pulp and paper, sugar, distillery, tannery, dairy, textile. *Planning*- Small-scale industries and pollution issues, concept of CETPs, planning of industrial estate, concept of zero discharge	15		
		28	**14**	

Evaluation criteria

2 minor tests	20% each
Assignments	10%
Major	50%

Learning outcomes

1. analyse and industrial activity and identify the environmental problems
2. plan strategies to control and reduce pollution
3. select the most appropriate technique to control and treat industrial pollution
4. apply environmental management systems (EMS) to an industrial activity

Pedagogical approach

Classroom teaching will involve black board, power point presentations, and case study analysis. The sessions will be interactive and use of scientific calculators in class is essential.

Materials

1. Nelson L. Nemerow, (1995). *Zero Pollution for Industry: Waste minimization through industrial complexes.* John Wiley & Sons, New York

2. CPCB publications (COINDS series for case studies)
3. W.W. Eckenfelder (1990), Industrial pollution control: Mc Graw Hill Int. Ed.
4. Other suitable reference papers and books will be suggested in class.

Additional information (if any)

Student responsibilities

The course is highly technical so attendance and class participation will be given utmost importance. All assignments should be submitted as per the timeline.

Course reviewers

1. Prof Ram Karan Singh, Department of Civil Engineering, King Khalid University, Saudi Arabia.
2. Prof Narender Kanhe, Principal, Guru Nanak Institute of Engineering and Management, Nagpur.