**II.2.15 WATER POLLUTION**

**A. Course description:**

**1. Credit points: 3 ECTS**

**2. Time commitment**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Items | Lecture | Tutorial/  Exercise | Practice/  Assignment | Lab-work | Total |
| No. of hours | 27 |  |  | 9 | 36 |

**3. Prerequisites**

General chemistry and physics as well as environmental water chemistry of B1 and B2

**4. Recommended background knowledge**

Inorganic and organic chemistry

**5. Subject description**

This course provides knowledge and applications on water pollution with a focus on agricultural pollution as well as industrial pollution. The effects of water pollutants on human health and ecosystem will be discussed. Pollution in ground water, rivers, lakes and oceans will be studied...

**6. Objectives & Outcome**

* After this course, the successful student will:
* Be aware of the water pollution issues and challenges
* Understand the major types of water pollution and its effects on aquatic ecosystems.
* Understand and be able to identify the ways in which humans influence aquatic systems.
* Be able to know how to reduce water pollution

**7. Assessment/ Evaluation**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Component | Attendance | Exercises | Assignments | Practicals | Midterm | Final |
| Percentage % |  | 10 |  | 30 |  | 60 |

**8. Prescribed Textbook(s)**

None

**B. Course content**

1. Introduction

1.1. Water demand & disease

1.2. Characteristics of waters

1.2.1. Characteristics of ground waters

1.2.2. Characteristics of surface waters

1.2.3. Water quality standards

1.3. Global Climate Change & Water pollution

2. Water pollutants

2.1. Nature and types of water pollutants

2.2. Inorganic pollutans

2.2.1. Heavy metals

2.2.2. Metallois

2.2.3. Inorganic species

2.3. Algal nutrients and eutrophication

2.4. Organic pollutans

2.4.1. Soaps and Detergents

2.4.2. Biorefractory Organic Pollutants

2.4.3. Peticides and other persistent organic pollutants

3. Ground water pollution – Case studies

3.1. Ground water contamination sources

3.1.1. Municipal

3.1.2. Industry

3.1.3. Agriculture

3.2. Case studies

4. Rivers, lakes water pollution

4.1. Sources of surface water pollution

4.1.1. Urbanisation

4.1.2. Industry and Mining

4.1.3. Agriculture and Deforestation

4.1.4. Damming of Rivers and Energy Use

4.2. Case studies

5. Ocean water pollution

5.1. General Features of the Oceanic Environmen

5.2.Sources, movements and behaviour of individual pollutants

5.3. Mitigation of Marine Pollution

5.4. Case studies

Sampling strategy

**C. Reference Literature**

1. Manahan, Stanley E., Environmental Chemistry, CRC Press LLC, 2000

2. S.K. Agarwal, Water Pollution, APH Publishing, 20053. E. Roberts Alley, Water Quality Control Handbook, 2nd Ed., The McGraw-Hill Companies, Inc., 2007

4. Eugene R. Weiner, Applications of environmental aquatic chemistry : a practical guide. 2nd Ed. Taylor & Francis Group, LLC., 2007