

MODULE INFORMATION SHEET

Name of Module Unit	Surface Water Protection
Name in polish language	Ochrona wód powierzchniowych
Module type	compulsory / elective
Form of studying	full-time day courses
Level of study	graduate course (M.Sc. level)
Type of study (for extra-mural courses)	-
Programme	Environmental Engineering
Speciality	Environment Protection Engineering
Responsible department	Chair of Environmental Protection and Management
Responsible person	dr hab inż. Małgorzata Loga

Semester	Lectures(E)	Tutorials	Laboratory	Computer Exercises	Projects	ECTS
1	30				15	3

Learning outcomes (knowledge, skills, competences)

The aim of the module is to present processes relevant for water quality and water status, methods, techniques and technologies of protecting water resources. Models enabling simulations natural changes in water environment as well as introduced by pressures on water ecosystem are presented as modern tool form water management. Legal, economic and engineering aspects of water resources protection are addressed. European water related directives as Water Framework Directive, Bathing Directive, Nitrate Directive etc. are set as the basis in teaching modern methods of water quality assessment and classification.

Prerequisites

Calculus. Hydrology. Biology. Technologies of environmental protection and sewage treatment

Rules for integrated grade setting

60% of the lecture mark + 40% of mark for guided project

Recommended readings

- 1) Water Framework Directive 2000/60/EC,
- 2) Guidance documents for Common Implementation Strategy for the WFD
- 3) Handbook of Integrated Water Management in Basins Water-quality engineering in natural systems : fate and transport processes in the water environment / David A. Chin
- 4) Hydrodynamics and water quality : modeling rivers, lakes, and estuaries / Zhen-Gang Ji. Water encyclopedia. [Vol. 2],
- 5) Water quality and resource development / Jay Lehr, editor-in-chief, Jack Keeley, senior ed. At.al
- 6) Water body hydrodynamic and water quality modeling : an introductory workbook and CD-ROM on three-dimensional water body modelling
- 7) Jorgensen, Sven Eric; Chang, Ni-Bin; Xu, Fu-Liu; Ecological Modelling of Lakes and wetlands: Developments in Environmental Modelling 26, (2014)

8) Gulati, Ramesh D;; Caldwell, Martyn M (Editor) ; Díaz, Sandra (Editor) ; Heldmaier, Gerhard (Editor) ; Jackson, Robert B (Editor) ; Lange, Otto L (Editor) ; Levia, Delphis F (Editor) ; Mooney, Gulati, Ramesh D; Caldwell, Martyn M (Editor) ; Díaz, Sandra (Editor) ; Heldmaier, Gerhard (Editor) ; Jackson, Robert B (Editor) ; Lange, Otto L (Editor) ; Levia, Delphis F (Editor) ; Mooney, Harold A (Editor) ; Schulze, Ernst-Detlef (Editor) ; Sommer, Ulrich (Editor) ; Gulati, Ramesh D (Editor) ; Zadereev, Egor S (Editor) ; Degermendzhi, Andrei G (Editor), Ecology of Meromictic Lakes (2017) Ecological Studies

9) George, Glen (Editor) The Impact of Climate Change on European Lakes, Aquatic Ecology series (2010), Hoboken, NJ, USA: John Wiley & Sons, Inc.

Contents of lectures (syllabus)

	Topics	Time (hrs.)	Scope (S / Ex)
1	Introduction to environmental management	2	S
2	Point and distributed sources of pollution	2	S
3	Non-trophic pollutions	2	S
4	Eutrophication – causes, effects, legal aspects	2	S
5	Modelling processes of biodegradation of organic substances. Simple models for BOD-DO for river stretches.	2	S
6	Modelling processes catalyzed by microorganisms (Michaelis-Menten kinetics). Modelling nitrogen cycle.	2	S
7	Processes relevant for lakes quality and status.	3	S
8	Hydrodynamics of lakes	2	S
9	Modelling processes in lakes. Examples of lake models.	3	S
10	Water status assessment	3	S
11	Uncertainty of water status assessment	3	S/Ex
12	Lake restoration	2	S/Ex
13	Protection of wetlands	2	S/Ex
Total		30	hours

S – topics listed in the legal study programme standards from 12.07.2007

Ex – extended topics

Lecturers

dr hab.inż. Małgorzata Loga

Assessment method

Open question test.

Contents of guided projects

	Topics	Time (hrs.)	Scope (S / Ex)
1	Introduction to water quality modelling in R!	3	S
2	Modeling population dynamics with the Lotka-Volterra equations	2	S
3	Streeter-Phelps BOD-DO model	2	S
4	Nitrification models	2	S
5	Phosphorus dynamic model	2	S

6	Advanced aspects of water quality modeling using R!	2	S/Ex
7	Simple HEC-RAS hydraulic model	2	S/Ex
Total		15	hours

S – topics listed in the legal study programme standards from 12.07.2007

Ex – extended topics

Persons responsible for guided projects

mgr inż. Paweł Gilewski

Assessment method for guided projects

The students have to prepare the reports from every class which are afterward evaluated and must be defended.