

**I. Tantárgyleírás****1. Alapadatok***1.1 Tantárgy neve***WATER QUALITY MANAGEMENT CASE STUDIES***1.2 Azonosító (tantárgykód)***BMEEOVKMSFIN06-00***1.3 Tantárgy jellege*

Kontaktórás tanegység

*1.4 Óraszámok*

| Típus             | Óraszám / (nap) |
|-------------------|-----------------|
| Előadás (elmélet) | 1               |
| Gyakorlat         | 1               |

*1.5 Tanulmányi teljesítményértékelés (minőségi értékelés) típusa*

Félévközi érdemjegy

*1.6 Kreditszám*

3

*1.7 Tárgyfelelős*

|          |                                                                              |
|----------|------------------------------------------------------------------------------|
| név      | Dr. Clement Adrienne                                                         |
| beosztás | Egyetemi docens                                                              |
| email    | <a href="mailto:clement.adrienne@emk.bme.hu">clement.adrienne@emk.bme.hu</a> |

*1.8 Tantárgyat gondozó oktatási szervezeti egység*

Vízi Közmű és Környezetmérnöki Tanszék

*1.9 A tantárgy weblapja*[epito.bme.hu](http://epito.bme.hu)<https://edu.epito.bme.hu/course/view.php?id=5046>*1.10 Az oktatás nyelve*

magyar

*1.11 Tantárgy típusa*

Kötelezően választható az Infrastruktúra-építőmérnök (MSc) szak Víz- és vízi környezetmérnöki specializációján

*1.12 Előkövetelmények**1.13 Tantárgyleírás érvényessége*

2025. szeptember 1.

## **2. Célkitűzések és tanulási eredmények**

### *2.1 Célkitűzések*

The course aims to provide knowledge, methodology and tools for water quality management. The case studies presented cover the topics of water quality assessment, identification of main pollutants and pollution sources, analysis of the impact of emissions on water quality, estimation of diffuse loads, calculation of load capacity and planning of mitigation measures to ensure the achievement of the target water quality status. In addition to knowledge transfer, an important aim of the course is to prepare students for independent problem solving. During the development of the practical task, they will apply methodological (planning) principles to the preparation of water quality management strategies.

### *2.2 Tanulási eredmények*

A tantárgy sikeres teljesítése után a hallgató

#### A. Tudás

1. Will know the anthropogenic pressures on the aquatic environment and their consequences. 2. Will get an overview of the conceptual framework of the Water Framework Directive (WFD) and the water quality management aspects of river basin management planning. 3. Will know the terms of water quality and the water classification systems in their contexts. 4. Will know the concept of load capacity and the method of immission load-based regulation. 5. Will be informed about the regulations for point sources (wastewater discharges). 6. Will be aware of the basics of water quality modelling (describing changes in oxygen household and plant nutrients in rivers and lake waters). 7. Will be aware of the tools/approaches for non-point load calculation on catchment level. 8 Will have a comprehensive knowledge of the status of European waters and the typical forms of pollution of surface and groundwater resources.

#### B. Képesség

1. Recognises and understands the role of water engineering in relation to the protection of the water environment. 2. Capable to prepare water quality impact analysis and to develop a water quality control strategy at the catchment scale. 3. Will be able to apply simple water quality models, to build up simpler models on your own. 4. At the application level, will be able to use GIS, software, to perform thematic maps. 5. Will be able to gather information needed to explore water quality problems, navigate international databases and information systems. 6. Will be able to conduct targeted literature searches and synthesise information. 7. Will be able to develop a solution for a specific problem. 8. Will be able to prepare technical documentation and present results in writing and in the form of an oral presentation.

#### C. Attitűd

1. Engages in collaboration with instructors and peers to expand their knowledge base. 2. Actively seeks to deepen their understanding by continuously acquiring new information, including consulting online resources beyond mandatory course materials. 3. Open to using IT tools. 4 Open to cooperating with representatives of other disciplines. 5. Strives for clarity and precision in verbal communication, while maintaining a structured, high-quality approach to written documentation that aligns with engineering industry standards.

#### D. Önállóság és felelősség

1. Collaborates with peers as part of a team to solve tasks. 2. Applies a system-oriented approach in their thinking. 3. Takes responsibility for their own learning and actively seeks solutions to challenges independently. 4. Demonstrates initiative in problem-solving while considering both technical and regulatory constraints. 5. Open to cooperating with representatives of other fields in the course of solving his/her tasks.

### *2.3 Oktatási módszertan*

Lectures with theoretical knowledge; communication in writing and speaking. Practical classes. Individual work.

### *2.4 Részletes tárgyprogram*

1. Water quality management: tasks and goals, general introduction. The principles of the DPSIR method. 2. EU legislation (directives in the field of water and environment). The objective of the Water Framework Directive and the basics of river basin management planning. 3. Types of water pollution and their impacts on the aquatic environment. 4. Exercise (1) - water quality management planning, determination of wastewater effluent limit values as a function of the water quality target status. 5. River water quality modelling, load capacity based assessment. 6. Exercise (2) - application of a simple decay model. Indirect estimation of diffuse load on a material balance basis. 7. Basics of water quality modelling, oxygen household in rivers, Streeter-Phelps model

and its extensions. 8. Exercise (3) - determination of dissolved oxygen concentration profile in the river. 9. Water quality of lakes, eutrophication models. Case study: water quality management of Lake Balaton. 10. Exercise (4) - Lake Phosphorus retention design. 11. Diffuse pollution: application of GIS based emission models. MONERIS, MoRE case studies. 12. Complex watershed models, case studies. 13-14. Student's presentations

A félév közbeni munkaszüneti napok miatt a program csak tájékoztató jellegű, a pontos időpontokat a tárgy honlapján elérhető "Részletes féléves ütemterv" tartalmazza.

### *2.5 Tanulástámogató anyagok*

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Lecture slides Hands-on work materials

### *2.6 Egyéb tudnivalók*

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Attendance at classes is mandatory. A student who misses more than 30% of the sessions will not be eligible to earn course credits.

### *2.7 Konzultációs lehetőségek*

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Contact the lecturers via e-mail: [clement.adrienne@emk.bme.hu](mailto:clement.adrienne@emk.bme.hu)

*Jelen TAD az alábbi félévre érvényes:*

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## II. Tárgykövetelmények

### 3. A tanulmányi teljesítmény ellenőrzése és értékelése

#### 3.1 Általános szabályok

The assessment of the learning outcomes specified in section 2.2. is conducted through a midterm test and a homework (individual research in a chosen topic). Furthermore, 4 small tasks (hands-on works) must be submitted during the semester.

#### 3.2 Teljesítményértékelési módszerek

| Assessment Name (Type)           | Code | Assessed Learning Outcomes |
|----------------------------------|------|----------------------------|
| Midterm online test              | MT   | A.1-A.8, D1-5, C1-5        |
| Hands-on works (1-4)             | HW   | B1-3, D1-5, C1-5           |
| Individual work and presentation | IW   | B4-8, D1-5, C1-5           |

A szorgalmi időszakban tartott értékelések pontos idejét, a házi feladatok ki- és beadási határidejét a "Részletes féléves ütemterv" tartalmazza, mely elérhető a tárgy honlapján.

#### 3.3 Teljesítményértékelések részaránya a minősítésben

| Code  | Weight |
|-------|--------|
| MT    | 20%    |
| HW    | 40%    |
| IW    | 40%    |
| Total | 100%   |

#### 3.4 Az aláírás megszerzésének feltétele, az aláírás érvényessége

There is no signature in case of this course.

#### 3.5 Érdemjegy megállapítása

| Grade            | Score (P)          |
|------------------|--------------------|
| excellent (5)    | $80 \leq P$        |
| good (4)         | $70 \leq P < 90\%$ |
| satisfactory (3) | $60 \leq P < 80\%$ |
| pass (2)         | $50 \leq P < 65\%$ |
| fail (1)         | $P < 50\%$         |

#### 3.6 Javítás és pótlás

In the case of a failed midterm test, a retake is possible in accordance with the Academic and Examination Regulations (TVSZ). A second retake is also available upon payment of a special procedure fee. Submission of tasks and the Individual work can be replaced in week 15 upon payment of a special procedure fee.

#### 3.7 A tantárgy elvégzéséhez szükséges tanulmányi munka

| Activity                         | Hours/Semester    |
|----------------------------------|-------------------|
| Participation in contact classes | $14 \cdot 2 = 28$ |
| Independent work                 | 40                |
| Preparation for the midterm test | 22                |

#### 3.8 A tárgykövetelmények érvényessége

2025. szeptember 1.

Jelen TAD az alábbi félévre érvényes: