**Aquatic Pollution and Wastewater Management**

**Coordinator:** M. O. Angelidis

**Lecturers/Instructors**: *Michael O. Angelidis, Athanasios Stasinakis, Olga-Ioanna Kalantzi*

**ECTS Credits**: 2

**Pre-requisites**:  none

**Course e-learning site:** <https://aegeanmoodle.aegean.gr>

### Aims, Objectives and Learning Outcomes

The aim of the course is to provide students with an understanding about the key concepts of aquatic pollution from municipal and industrial wastewater and the organisation of relevant pollution monitoring programmes. The objectives of the course are to provide students with an understanding about: a) the characteristics of municipal wastewater and the basic treatment processes; b) the fate of organic matter, pathogens, nutrients and metals in the aquatic environment; c) the ecological and public health effects of major wastewater contaminants; d) the organisation and implementation of a pollution monitoring programme to assess the environmental quality of the receiving water bodies. The key EU Legislation to assess the status of freshwater and marine environments and to allow wastewater discharge to the environment will also be presented.

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| **Learning Outcomes** | **Assessment** | **Activities** | **Estimated Workload** |
| After successfully completing this course, the students will be able to understand:* The nature of major groups of contaminants occurring in municipal and industrial wastewater
* The fate of contaminants in the receiving water bodies
* The ecological and public health effects of major wastewater contaminants
* The fundamentals of wastewater treatment, including the common physical, chemical and biological unit operations encountered in treatment process
* The EU statutory and regulatory approaches to water quality management, water quality standards and criteria and wastewater management
* The principles for the organisation of a receiving water and wastewater quality monitoring programme
 | Students will be individually graded based on:1. Individual assessment (written exam on lecture material) (40%)
2. Evaluation of a written report– case study (60%)
 | Lectures Field tripsIndependent work/ study  | 16h 4h30h |
| Total hours 50 |   |   | 50 |

**Additional information including a full description of course assessments, schedule, and readings can be found in the full course syllabus located in at the course’s e-learning site.**

**Content outline:**

* Introduction to water pollution: key concepts of pollution; major groups of contaminants in municipal and industrial wastewater; fate of contaminants in the aquatic environment; impact to human health and the aquatic ecosystem
* Key wastewater contaminants: Biodegradable organic matter – oxygen demanding wastes; nutrients and eutrophication; pathogenic microorganisms, heavy metals
* Aquatic pollution monitoring programmes: sampling strategy, sample preservation, analysis of contaminants, data quality assurance, assessment of pollution status
* EU legislation: EU Water Framework Directive (Directive 2000/60/EC); EU Marine Strategy Framework Directive (Directive 2008/56/EC)
* Introduction to aquatic toxicology: toxicity assays of wastewater, acute and chronic toxicity
* Wastewater and public health: pathogens and water-borne diseases
* Municipal Wastewater Treatment and Reuse: basic processes, current status in EU and legislation
* Sewage Sludge Treatment and Reuse: methods, sludge management in EU, legislation
* Field trip: Visit to the municipal Wastewater Treatment Plant of Mytilene
* Field trip: River sampling and monitoring