**COURSE OUTLINE**

1. **GENERAL**

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| **SCHOOLS** | School of Engineering |
| **ACADEMIC UNIT/UNITS** | Department of Civil Engineering  |
| **TITLE OF MASTER’S DEGREE** | Master’s Degree "Design of Resilient, Sustainable and Intelligent Infrastructures". Tracks:(A) Resilient Materials, Structures and Geotechnical Infrastructures,(B) Hydraulic and Environmental Engineering for Sustainable Infrastructures, and (C) Intelligent Systems in Transportation and Construction Project Management |
| **LEVEL OF STUDIES** | Postgraduate  |
| **COURSE CODE** | **New** | **SEMESTER** | **A** |
| **COURSE TITLE** | Resource Recovery from Wastewater  |
| **INDEPENDENT TEACHING ACTIVITIES** *if credits are awarded for separate components of the course, e.g. lectures, laboratory exercises, etc. If the credits are awarded for the whole of the course, give the weekly teaching hours and the total credits* | **WEEKLY TEACHING HOURS** | **CREDITS** |
| lectures | 3 | 7.5 |
|  |  |  |
| *Add rows if necessary. The organisation of teaching and the teaching methods used are described in detail at (d).* | Total |  |
| **COURSE TYPE***general background, special background, specialised general knowledge, skills development* | Specialised general knowledge |
| **PREREQUISITE COURSES:** |  |
| **LANGUAGE OF INSTRUCTION and EXAMINATIONS:** | Greek |
| **IS THE COURSE OFFERED TO ERASMUS STUDENTS** | Yes |
| **COURSE WEBSITE (URL)** |  |

1. **LEARNING OUTCOMES**

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| **Learning outcomes** |
| *The course learning outcomes, specific knowledge, skills and competences of an appropriate level, which the students will acquire with the successful completion of the course are described.**Consult Appendix A* * *Description of the level of learning outcomes for each qualifications cycle, according to the Qualifications Framework of the European Higher Education Area*
* *Descriptors for Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning and Appendix B*
* *Guidelines for writing Learning Outcomes*
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| Upon completion, student should be able to have an integrated approach of sustainable wastewater treatment with emphasis on physicochemical and biological processes for the recovery of energy and useful compounds from wastewater.  |

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| **General Competences**  |
| *Taking into consideration the general competences that the degree-holder must acquire (as these appear in the Diploma Supplement and appear below), at which of the following does the course aim?* |
| *Search for, analysis and synthesis of data and information, with the use of the necessary technology* *Adapting to new situations* *Decision-making* *Working independently* *Team work**Working in an international environment* *Working in an interdisciplinary environment* *Production of new research ideas*  | *Project planning and management* *Respect for difference and multiculturalism* *Respect for the natural environment* *Showing social, professional and ethical responsibility and sensitivity to gender issues* *Criticism and self-criticism* *Production of free, creative and inductive thinking**……**Others…**…….* |
| * Working independently
* Criticism and self-criticism
* Working in an interdisciplinary environment
* Respect of the natural environment
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1. **SYLLABUS**

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| * Sustainable wastewater management.
* Resources recovery methods from wastewater.
* Biological processes for energy and nutrient recovery.
* Physicochemical processes for nutrient recovery.
* Economic evaluation of resource recovery processes in wastewater treatment plants.
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**TEACHING and LEARNING METHODS - EVALUATION**

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| **DELIVERY***Face-to-face, Distance learning, etc.* | Face-to-face, distance learning |
| **USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY** *Use of ICT in teaching, laboratory education, communication with students* | Use of ICT* during lectures

Support the learning process through the e-class platform. |
| **TEACHING METHODS***The manner and methods of teaching are described in detail.**Lectures, seminars, laboratory practice, fieldwork, study and analysis of bibliography, tutorials, placements, clinical practice, art workshop, interactive teaching, educational visits, project, essay writing, artistic creativity, etc.**The student's study hours for each learning activity are given as well as the hours of non-directed study according to the principles of the ECTS* |

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| ***Activity*** | ***Semester workload*** |
| Lectures | 39 |
| Independent study  | 100 |
| Assignments and laboratory exercises  | 45 |
| Examination | 3.5 |
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| Total | 187.5 |

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| **STUDENT PERFORMANCE EVALUATION***Description of the evaluation procedure**Language of evaluation, methods of evaluation, summative or conclusive, multiple choice questionnaires, short-answer questions, open-ended questions, problem solving, written work, essay/report, oral examination, public presentation, laboratory work, clinical examination of patient, art interpretation, other**Specifically-defined evaluation criteria are given, and if and where they are accessible to students.* | * Assignments (50%)
* Written exams (50%)

Minimum pass score: 5Maximum pass score: 10 |
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1. **ATTACHED BIBLIOGRAPHY**

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| * Manariotis, Ι.D. (2020). Wastewater Treatment. Notes. University of Patras, Patras (in Greek).
* Tsonis, S.P. (2004). Wastewater Treatment. Papasotiriou publications, Athens.
* Henze, M., van Loosdrecht, M.C.M., Ekama, G.A. and Brdjanovic, D. (2008). Biological Wastewater Treatment: Principles, Modelling and Design. IWA Publishing, Cambridge University Press.
* Metcalf and Eddy Inc., Burton, F., Stensel, D., Tchobanoglous G., Tsuchihashi, R. (2013). Wastewater Engineering: Treatment and Resource Recovery, 5th ed. McGraw-Hill, New York, NY.
* Rittmann, B.E. and McCarty, P.L. (2001). Environmental Biotechnology: Principles and Applications. Mc-Graw-Hill Companies, Inc
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