**COURSE OUTLINE**

1. **GENERAL**

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| **SCHOOL** | SCHOOL OF ENGINEERING | | | | |
| **ACADEMIC UNIT** | DEPARTMENT OF CIVIL ENGINEERING | | | | |
|  | UNIVERSITY OF PATRAS | | | | |
| **POSTGRADUATE PROGRAM: TITLE** | 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** | GRADUATE PROGRAM | | | | |
| **COURSE CODE** | **GPOL\_C\_16015** | **SEMESTER** | | SPRING (B’) | |
| **COURSE TITLE** | Connected and Autonomous Intelligent Transport Systems Design | | | | |
| **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** |
|  | | | 3 | | 7.5 |
|  | | |  | |  |
| *Add rows if necessary. The organisation of teaching and the teaching methods used are described in detail at (d).* | | |  | |  |
| **COURSE TYPE**  *general background,  special background, specialised general knowledge, skills development* | Special background | | | | |
| **PREREQUISITE COURSES:** | Smart cities, infrastructure and transportation or Connected Intelligent Transport Systems or Autonomy and Artificial Intelligence in Transport | | | | |
| **LANGUAGE OF INSTRUCTION and EXAMINATIONS:** | Greek | | | | |
| **IS THE COURSE OFFERED TO ERASMUS STUDENTS** | It can be offered | | | | |
| **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* | |
| *Knowledge in Connected Intelligent Transport Systems (C-ITS)*  *Knowledge in Autonomous Intelligent Intermodal Transport Systems (AITS)*  *Skills in analysis and design of C-ITS and AITS data and solutions*  *Competence in drawing conclusions from the design of C-ITS/AITS solutions* | |
| **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…*  *…….* |
| *Search for information, analysis and synthesis of data with the use of the necessary technology*  *Adapting to new situations*  *Decision-making*  *Working independently*  *Teamwork*  *Working in an international environment*  *Working in an interdisciplinary environment*  *Creation of new research ideas*  *Respect for the natural environment*  *Generation of free, creative and inductive thinking* | |

1. **SYLLABUS**

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| * Real-time hub management models. * Safe and secure autonomous parking area management. * Combined autonomous transport systems. * Macroscopic risk assessment and incident detection in intermodal and transshipment hubs design. * Vehicle location and microscopic risk assessment. * Vehicle autonomy and driver/pedestrian behavior modelling. * Dynamic impact models using selected design methods with vector autoregression, pattern recognition, neural networks, genetic algorithms. |

1. **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 in teaching,*  *Use of ICT in laboratory education,*  *Use of ICT in communication with students* |
| **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* | |  |  | | --- | --- | | ***Activity*** | ***Semester workload*** | | Lectures | 16 | | Seminars | 4 | | Laboratory practice | 22 | | Fieldwork | 10 | | Study & analysis of bibliography | 15 | | Interactive teaching | 22 | | Educational visits | 2 | | Project | 50.5 | | Report presenting | 4 | | Report writing | 28 | | Non-directed study | 14 | | *Course total* | ***187.5*** | |
| **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.* | Language of evaluation: Greek & English  Methods of evaluation: Research comparative analysis, written work, oral examination, laboratory work, public presentation, final written report  Specific criteria are accessible to students |

1. **SUGGESTED BIBLIOGRAPHY**

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| --- |
| Bizon, N., Dascalescu, L., and Tabatabaei, N. (2014). Autonomous vehicles: Intelligent transport systems and smart technologies, (Eds.), Nova, New York, N.Y., ISBN: 978-1-63321-326-5.  Chu, K., Lam, A., Li, V. (2020). “[Dynamic Lane Reversal Routing and Scheduling for Connected Autonomous Vehicles: Formulation and Distributed Algorithm](https://ieeexplore.ieee.org/document/8736507),” *IEEE Transactions on Intelligent Transportation Systems*, 21:6, 2557–2570, June.  Yu, J. and Lam, A. (2017). “[Autonomous Vehicle Logistic System: Joint Routing and Charging Strategy](http://ieeexplore.ieee.org/document/8115230/),” *IEEE Transactions on Intelligent Transport Systems: Special Issue on Advances in Smart and Green Transportation for Smart Cities*.  Lam, A., Leung, Y., Chu, X. (2016). “[Autonomous Vehicle Public Transportation System: Scheduling and Admission Control](http://ieeexplore.ieee.org/xpl/articleDetails.jsp?arnumber=7393588),” *IEEE Transactions on Intelligent Transportation Systems*, 17:5, 1210–1226, May.  Tomizuka, M. (1997). Automated highway systems – An intelligent transportation system for the next century. IEEE International Symposium on Industrial Electronics (ISIE), 7-11 July, IEEE Xplore, ISBN: 0-7803-3936-3.  USDOT (2020). Strategic Plan 2020-2025. John A. Volpe National Transportation Systems Center, Intelligent Transportation Systems Joint Program Office, and Office of the Assistant Secretary for Research and Technology, U.S. Dept. of Transportation, FHWA-JPO-18-746. |