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**COURSE TEMPLATE ON**

**URBAN ROADS**

**MASTER IN CIVIL ENGINEERING**

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Curricula innovation in climate-smart urban development based on greenand energy efficiency with the non-academic sector

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| **DOCUMENT CONTROL SHEET** |
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| Work package  | WP3 Capacity building of WB HEIs |
| Ref. no and title of activity | T3.1 Modernization of university courses in collaboration with the industry sector |
| Title of deliverable | D3.1. Report on modernized university courses |
| Lead institution | URJC |
| Author(s) | Carmen de Pablos-Heredero & Miguel Blanco-Callejo |
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| Version | Date | Revision description | Partner responsible |
| v.01 | 8th March, 2023 | First template | URJC |
| v.02 | 20th November, 2023 | Second draft | UNSA |
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| v.04 | 25th January, 2024 | Final Draft | UNSA |
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| **URBAN ROADS** |
| Type | Obligatory |
| Teaching period | Master cycle course, 1st semester |
| ECTS credits | 6 |
| Language | Bosnian / English |

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| **II. Presentation** |
| The main objective of this course is to an acquaintance of students with basic principles in the analysis and design of urban roads. To explain to students the basic physical terms related to traffic flows and ways of analyzing the level of service of urban intersections and streets, design conditions, and elements of primary and secondary network roads. |

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| **III. Competences** |
| **Generic competences** |
| 1. Ability to present one’s own points of view and analyse and evaluate alternatives in the area of analysis and design of urban roads.
2. Ability to verify and integrate up-to-date knowledge in the field of analysis and design of urban roads.
3. Ability to creatively apply knowledge in the area of analysis and design of Urban Roads. Students apply their acquired knowledge and problem-solving skills in new or unfamiliar environments within broader (or multidisciplinary) contexts related to the area of analysis and design of Urban Roads.
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| **Specific competences** |
| 1. Understand the functioning of the traffic network and traffic flows in urban conditions.
2. Understands the basic terms related to the analysis of traffic flows
3. Understands the basic traffic flow equation
4. Knows how to define basic terms related to the analysis of signalized intersections
5. Can calculate the capacity and average delay of a signalized intersection
6. Knows how to define the basic concepts related to the analysis of unsignalized intersections with special reference to roundabouts
7. Knows how to calculate the capacity and average delay of roundabouts
8. Independently create a level of service analysis and the choice of design elements for urban roads.
9. Know how to comment on the results of various efficiency measures and compare different project solutions based on them.
10. Know how to use software tools for analysing traffic flows.
11. Understands and identifies the basic problems related to the urban road network with special reference to their functional difference and differences in relation to the non-urban network
12. Know how to design different parts of urban road network according to the principle of functional hierarchy.
13. Propose appropriate urban road network solutions based on the overall urban development and respecting the requirements of all road users.
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| **IV. Contents****VI.A. Syllabus** |
| Chapter 1. **Basic parameters of traffic flows; the basic traffic flow equation**Practice 1/Laboratory/simulation. **Field traffic counting**Chapter 2. **Basic parameters of traffic flows: signalized intersections**Practice 2/Laboratory/simulation. **Analysis of one existing signalized intersection using HCM methodology and Highway Capacity Software (capacity calculation, delay calculation, critical lane determination, queue length)**Chapter 3. **Basic parameters of traffic flows: signalized intersections – HCM methodology**Practice 3/Laboratory/simulation. **Analysis of one existing signalized intersection using HCM methodology and Highway Capacity Software (capacity calculation, delay calculation, critical lane determination, queue length)**Chapter 4. **Basic parameters of traffic flows: roundabouts**Practice 4/Laboratory/simulation. **Level of service analysis of one-lane and two-lane roundabouts (capacity calculation, delay calculation, queue length, gap-acceptance parameters calculation)**Chapter 5. **Basic parameters of traffic flows: roundabouts - turbo roundabouts**Practice 5/Laboratory/simulation. **Level of service analysis of turbo roundabouts (capacity calculation, delay calculation, queue length, gap-acceptance parameters calculation)**Chapter 6. **Analysis of traffic flows using the DataFromSky tool**Practice 6/Laboratory/simulation. **Traffic analysis of different road network elements using DataFromSky application**Chapter 7. **Unsignalized intersections – HCM methodology: TWSC and AWSC intersections**Practice 7/Laboratory/simulation. **Analysis of unsignalized intersections using HCM methodology and Highway Capacity Software (capacity calculation, delay calculation, critical lane determination, queue length)**Chapter 8. **Analysis of city arteries**Practice 8/Laboratory/simulation. **Analysis of urban streets (capacity calculation, average travel time, average speed, corridor calculation)**Chapter 9. **Basics of traffic microsimulations**Practice 9/Laboratory/simulation. **Introducing to PTV Vissim software; Commenting on different microsimulation models**Chapter 10. **Introduction to the elements of the urban road network: design elements of the primary and secondary road networks**Practice 10/Laboratory/simulation. **Commenting and analysis of different existing urban plans and traffic solutions in Sarajevo**Chapter 11. **Introduction to the elements of the urban road network: city and suburban arterial streets**Practice 11/Laboratory/simulation. **Commenting and analysis of different existing urban plans and traffic solutions in Sarajevo**Chapter 12. **Traffic related air pollution: pollutant types, measuring and data collection, analysis and simulation of traffic flow to determine the level of pollution, measures to reduce air pollution (design changes, public transportation, public policy etc.)** Practice 12/Laboratory/simulation. **Data collection on the field, pollution measurement and traffic flow simulation.**Chapter 13. **Design for the future**Practice 13/Laboratory/simulation. **Impact of increased use of electric and self-driving vehicles. Implementation of simulation models.** |

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| **IV.B. Training activities** |  |
| **Type** | **Description** |
| Practical / Problem solving | Real-case analysis (Case-Study) and problem solving/existing intersections in Sarajevo (problems in terms of level of service and design elements)Real-case analysis (Case-Study) and problem solving/future road network plans in the Sarajevo region**Data collection on the field about traffic related pollution using new equipment, pollution measurement and traffic flow simulation.****Analysis of collected data about air quality and comparison with the simulation models.** |
| Other | Semester practical assignment – analysis of different types of intersections |

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| **V. Student workload (hours)** |  |
| Lecture classes | 30 |
| Practical classes/problem-solving, case studies, etc. | 30 |
| Tests | 2x1,5 |
| Academic tutorials | 15 |
| Total student workload | 120 |

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| **VI. Methodology and academic program** |  |  |
| **Type** | **Period** | **Content** |
| Theoretical Classes | Week 1 to Week 15 | Lectures, exposition and resolution of research works |
| Practical Classes | Week 1 to Week 15 | Practice resolution, cases, research discussions/laboratory/simulations |
| Seminars & exam | Week 7; 15 and 20-30 | Seminars and exam |

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| **VII. Assessment methods** |
| **VII.A. Assessment weighting** |
| **Continuous ordinary assessment:**During classes, the exam is written in two parts. Each part is scored as follows:* I partial test 60%
* II partial test 30%
* Semester assignment 10%

In each part of the exam, the student must achieve a minimum of 55% points for the part of the exam to be considered passed. If the student does not achieve sufficient points on the partial exam, he can achieve those on the final/remedial exam. The final grade will be formed after successful completion and acceptance of the semester assignment according to the time frames that will be presented to the students when the assignment is given. If the student does not fulfill all obligations by the end of the semester, i.e. does not pass the exam, the assignment must still be accepted by the end of that semester for the student to acquire the condition for taking the exam in the September remedial deadlines.If the student fulfills all the above obligations, a final grade is formed according to the scale prescribed by the Law on Higher Education.Students who lack less than 5 points for grades 8, 9, and 10 can take the final exam orally for a higher grade.Cancellation of the exam: Students who have passed the partial exam and are not satisfied with the results achieved can cancel it within 5 working days after the announcement of the exam results and retake the same in the final/remedial exam. The same applies to the results of the final/remedial exam. |

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| **VIII. Bibliography** |
| **Basic bibliography** |
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| **IX.Lecturers/Teachers/Professors** |  |
| **Lecturer/teacher/professor´s name** | Ammar Šarić |
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