

Course on Smart, Sustainable and Resilient Urban mobility

A FREE course offered in the framework of the project

“Building resilience through education for Sustainable,
Collaborative and Smart Cities”

(RESICITIES)



Funded by the
Erasmus+ Programme
of the European Union

October 25 to November 24, 2023 (online lectures + optional Mobility Week in Prague)



**Free
registration**
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Developed by
 **FACULTY OF
TRANSPORTATION
SCIENCES
CTU IN PRAGUE**

**Course on Sustainable, Smart and
Resilient Urban Mobility**
www.resicities.eu

Online lectures on:
October 25, 27, 30
November 2, 9, 10, 13, 14, 15

Mobility Week (Optional):
November 20-24, 2023

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Welcome

This course was developed and will be offered by a group of lecturers of the Faculty of Transportation Sciences of the Czech Technical University in Prague (FTS CTU) within the RESICITIES project.

For a comprehensive understanding of our esteemed lecturers, detailed profiles have been provided within the description of their respective modules. We encourage you to explore these profiles to familiarize yourself with the expertise and contributions of each lecturer to the field of transportation sciences.

Course objectives

This course is meticulously designed to provide students with a holistic understanding of the multifaceted realm of urban mobility. By delving deep into the intricacies of transportation, land use, and urban planning, it aims to equip participants with the knowledge and skills to navigate the challenges and opportunities of the modern urban landscape. The course is structured around six comprehensive modules, each focusing on a distinct aspect of urban mobility, ensuring a well-rounded grasp of the subject.

- **Transportation and Land Use Planning:** Understand the symbiotic relationship between transportation systems and urban land use, and the pivotal role of effective planning in creating sustainable urban environments.
- **Transport and Environment:** Explore the environmental impact of transportation systems, emphasizing the need for sustainable practices and solutions to mitigate negative effects.
- **Smart and Automated Urban Mobility:** Dive into the world of smart mobility solutions and the potential of automated vehicles in reshaping urban transportation, enhancing efficiency, and improving quality of life.
- **Traffic Surveys:** Acquire hands-on knowledge of traffic survey methodologies, data collection techniques, and their significance in transportation planning and decision-making.
- **Navigating Climate Challenges: Urban Mobility and Resilience Strategies:** Address the pressing challenges posed by climate change on urban mobility. Learn about resilience strategies and adaptation measures to ensure sustainable and efficient urban transportation in the face of environmental challenges.
- **Strategic Planning of Electric Mobility:** Delve into the future of transportation with a focus on electric mobility. Understand the strategic planning required to integrate electric vehicles into the urban fabric, ensuring sustainability and efficiency.

Target audience

This course is tailored for graduate and postgraduate students with specializations in Urban Planning, Transportation Engineering, Environmental Studies, and Sustainable Development. It is particularly suited for those who aspire to become professionals in the field of urban development and transportation. This includes future policy makers, urban strategists, and researchers who are keen on exploring the intersection of climate change, urbanization, and transportation. The course content is also beneficial for students and current professionals seeking to learn or enhance their expertise in smart mobility solutions in urban environments.

Overview of modules

Module 1: Transportation and Land Use Planning

2 lectures of 1.5h, October 25 (Wednesday), 2023 - from 10AM to 1PM

Lecturer: Dr. Dagmar Kočárková

Dive into the intricate relationship between transportation systems and territorial planning in this comprehensive module. Understand the foundational principles that guide transport solutions, and the profound impact transportation has on urban landscapes. Explore the diverse transportation modes, with a special emphasis on sustainable options like pedestrian and bicycle transport. Delve into the strategies of traffic calming to create safer and more livable urban spaces. Familiarize yourself with the Sustainable Urban Mobility Plan (SUMP) framework and its economic implications. Lastly, gain insights into the phenomenon of suburbanization and its influence on transportation and land use. This module offers a holistic view of transportation planning, ensuring participants are well-equipped to design and implement effective and sustainable transport strategies in urban settings.

Module 2: Transport and Environment

2 lectures of 1.5h each, October 27 (Friday), 2023 from 10AM to 1PM

Lecturer: Assoc. Prof. Kristýna Neubergová

Embark on a comprehensive exploration of the environmental implications of transportation in this enlightening module. Begin by understanding the challenges posed by traffic noise, learning about its measurement techniques and the strategies employed to reduce or prevent its adverse effects. Delve into the multifaceted impact of transportation on the environment, examining the air, water and other forms of pollution from transport. Grasp the intricate relationship between climate change and transport and understand the broader environmental challenges it presents. Explore the concept of fragmentation and the barrier effect, and how they influence ecosystems and urban habitats. Concluding the module, participants will gain a thorough understanding of sustainable transportation, its principles, and its significance in creating eco-friendly urban environments. This module is designed to equip participants with

the knowledge to advocate for and implement environmentally conscious transportation solutions.

Module 3 – Smart and Automated Urban Mobility

2 lectures of 1.5h each

First lecture: October 30 (Monday), 2023 – from 10AM to 11:30AM

Second lecture: November 13 (Monday), 2023 - from 1PM to 2:30PM

Lecturer: Prof. Ondřej Přibyl

Step into the transformative world of urban transportation with this module that delves into both Smart Mobility and Automated Urban Mobility. Understand the intricacies of how transportation in smart cities not only integrates with pivotal sectors like land use, energy management, and environmental conservation but also embraces the advancements of automated vehicles in urban settings. This module underscores the importance of a cohesive approach, ensuring that all subfields, from smart solutions to autonomous transportation, work in harmony. Students will be introduced to advanced transportation modeling techniques, transcending traditional methods. They will also explore the potential and challenges of automated vehicles, understanding their role in enhancing urban mobility while ensuring safety and efficiency. By the end of this module, participants will be equipped with the skills and knowledge to champion and implement mobility solutions that are at the forefront of innovation, sustainability, and benefit to urban communities.

Module 4 –Traffic Surveys

2 lectures of 1.5h each

First lecture: November 2 (Thursday), 2023 – from 10AM to 11:30AM

Lecturer: Ing. Petr Richter, PhD candidate

Second lecture: November 2 (Thursday), 2023 – from 11:30PM to 1PM

Lecturer: Dr. Petr Kumpošt

Delve deep into the world of traffic data and its pivotal role in shaping urban transportation strategies. This module offers:

- **Traffic Data Collection Method:** Familiarize yourself with the methodologies employed in traffic data collection. Understand the journey of data from its raw form through pre-processing, processing, and finally, its presentation in a comprehensible format.
- **Micro-simulations:** Experience the power of micro-simulation software. Learn how to create intricate traffic models that allow for the evaluation of various traffic scenarios and their impact on the modeled network.
- **Traffic Survey Preparation 101:** Grasp the foundational steps in preparing for a traffic survey. From selecting the optimal date to determining which vehicle types to observe, this section ensures you're well-prepared to conduct meaningful surveys.

Note: During the Mobility Week, Petr Richter will exclusively lead the session related to this module, culminating in the proposal of an assignment for students.

Module 5 - Navigating Climate Challenges: Urban Mobility and Resilience Strategies

2 lectures of 1.5h each

First lecture: November 9 (Thursday), 2023 – from 10AM to 11:30AM

Second lecture: November 10 (Friday), 2023 - from 10AM to 11:30AM

Lecturer: Dr. Ticiano Costa Jordão

This module provides an in-depth exploration of the complex challenges that climate change introduces to urban mobility. Participants will delve into both global and urban-specific implications of climate change, understanding its effects on infrastructure, transport services, and the daily lives of city dwellers.

Embracing a challenge-based learning approach, inspired by the framework presented here (<https://www.challengebasedlearning.org/framework/>), the module emphasizes the importance of crafting resilient urban transport strategies in response to real-world challenges. Participants will be introduced to innovative solutions and the significance of robust urban supply chains.

During the Mobility Week, students will undertake an assignment that requires them to apply the principles and strategies learned through the challenge-based learning approach, offering a hands-on experience in addressing climate-related challenges in urban transport. Through this journey, attendees will be equipped with the knowledge and practical skills to navigate and address the pressing challenges of our changing climate in the realm of urban transportation.

Topics to be addressed:

- **Understanding Climate Impacts:** Delve into the global implications of climate change, focusing on its unique challenges to urban environments and mobility.
- **Infrastructure and Services:** Explore the tangible repercussions on urban infrastructure, including roads and public transport systems, and the subsequent effects on transport services.
- **Human Experiences:** Examine the day-to-day implications on urban residents and tourists, from altered commutes to shifts in travel patterns, and the associated health and economic ramifications.
- **Crafting Resilient Strategies:** Learn about designing flexible and adaptable urban transport systems, innovative green transport alternatives, and the importance of robust supply chains in urban resilience.

Module 6 – Strategic Planning of Electric Mobility

2 lectures of 1.5h each

First lecture: November 14 (Tuesday), 2023 – from 10AM to 11:30AM

Second lecture: November 15 (Wednesday), 2023 - from 10AM to 11:30AM

Lecturer: Dr. Ticiano Costa Jordão

This module will offer a comprehensive exploration of the multifaceted world of electric vehicles (EVs) and their integration into modern societies. This course delves into the economic, environmental, and social implications of EV adoption, emphasizing the importance of strategic planning to ensure sustainable results. Through a combination of theoretical knowledge and practical examples, participants will gain insights into the challenges and opportunities presented by electric mobility. The course is designed for students who aspire to become policy makers, urban planners, and business strategists oriented towards a sustainable future of transport.

Learning Outcomes

Upon successful completion of this course, students will be able to:

- **Comprehend the Interplay of Transportation and Urban Planning:**
 - Analyze the intricate relationship between transportation systems, land use, and urban planning.
 - Understand the principles of sustainable urban development and how transportation plays a pivotal role.
- **Understand Environmental Impacts of Transportation:**
 - Evaluate the environmental implications of various transportation modes.
 - Propose sustainable transportation solutions that minimize environmental degradation.
- **Grasp Concepts of Smart and Automated Urban Mobility:**
 - Understand the principles and applications of smart mobility in urban environments.
 - Analyze the potential and challenges of automated vehicles in urban settings.
 - Recognize the integration of smart mobility with other urban sectors and its potential to enhance urban quality of life.
- **Conduct Traffic Surveys and Data Collection:**
 - Gain practical skills in conducting traffic surveys and collecting transportation data.
 - Apply micro-simulation techniques to analyze transportation scenarios.
- **Navigate Climate Challenges in Urban Mobility:**
 - Understand the challenges posed by climate change to urban transportation.
 - Propose and evaluate strategies for enhancing the resilience and adaptation of urban transportation systems in the face of climate change.

- **Strategize Electric Mobility Planning:**

- Understand the fundamentals of electric mobility and its significance in sustainable urban transportation.
- Develop strategic plans for the integration and promotion of electric mobility in urban areas.

Course Participation Guidelines and Mobility Week Details

We are excited to offer an enriching educational experience through **the blended format** of the RESICITIES course. This format comprises 12 online sessions, culminating in an optional, yet highly enriching, Mobility Week to be held in Prague, Czech Republic.

Online Lectures:

Students can access the online lectures either synchronously (live, in real-time) or asynchronously (at a time convenient for them, after the live session). The asynchronous option is particularly beneficial for students who might face time zone differences or have conflicting schedules. (For those unfamiliar with the term "asynchronously", it means you can view the lectures at any time after they've been conducted, allowing flexibility in your learning schedule.)

The online lectures are scheduled on the following dates and will be conducted via the course group in Microsoft Teams:

- October 25, 27, 30
- November 2, 9, 10, 13, 14, 15

Upon registration, students will gain access to the course page and will receive detailed instructions on how to access the lectures and course materials.

Mobility Week (Optional but Highly Recommended):

For those interested in a immersive experience, we offer an optional Mobility Week from November 20 to November 24, 2023, at the Faculty of Transportation Sciences of Czech Technical University in Prague, Czech Republic. This week promises a rich blend of seminars, group activities centered around case studies, challenge-based learning and insightful technical visits.

While the Mobility Week is an added experience, it's not mandatory. Students from partner universities of the RESICITIES consortium keen on participating can apply for financial support to cover travel and accommodation expenses in Prague. Additionally, students from universities not part of the RESICITIES consortium are warmly invited to join the Mobility Week, bearing in mind they would need to cover their own travel expenses to Prague.

We encourage students from all universities, not just those within the RESICITIES consortium, to participate in this course and take advantage of the wealth of knowledge it offers.

Certificate and ECTS Credits Allocation

Graduate/postgraduate students who complete the course and participate in the Mobility Week will receive a certificate from CTU (the hosting institution). This certificate represents study hours and allows students to request 5 ECTS credits from their home institution.

However, students who finish the online sessions without attending the Mobility Week will get a digital certificate. This entitles them to request 3 ECTS credits from their home institution.

In summary, the course offers 3 ECTS for the online program and an additional 2 ECTS for the Mobility Week.

Important: CTU, the hosting institution, does not control whether the home institutions accept the claimed ECTS credits. The decision to accept these credits lies solely with the student's home institution.

How to apply

Students interested in applying to this course can access the application form in the link below and submit online. The students can use the same application form to apply for this course and also to any other course that was already created by RESICITIES consortium and is available online. This course is independent from other courses of RESICITIES consortium and the previous accomplishment of other courses of RESICITIES consortium is not a pre-requisite to apply and attend this course.

<https://www.resicities.eu/registration.htm>

Direct link to the application form [here](#).

About the lecturers

Lecturer of module 1 - Transportation and Land Use Planning

Dr. Dagmar Kočárková

Ing. Bc. Dagmar Kočárková, Ph.D., is a prominent figure at the Czech Technical University's Department of Transportation Systems of the FTS CTU. Holding key positions such as the Chairman of the Legislative Committee and Manager for Education, she plays a pivotal role in shaping the department's academic and administrative direction. Additionally, she is an active member of the Laboratory of Transportation Systems Safety.

Her teaching prowess is evident in her role as the course supervisor for both Bachelor's and Master's programs, covering essential topics like Sustainable Mobility, Land-Use Planning, and Introduction to Transportation Engineering. She also imparts knowledge to doctoral students, emphasizing the intricate relationship between transport and land-use planning.

Ing. Kočárková's research contributions to the field are noteworthy. Her recent publications delve into areas like the influence of people with reduced mobility on pedestrian currents, design considerations for public transport stops, and the nuances of bus operations in tramway

profiles, among others. Her work has been recognized and presented at various conferences and published in esteemed journals, making her an influential voice in transportation sciences.

For further insights into her work, her publications are readily available, shedding light on her extensive research and its implications for urban mobility and planning.

Lecturer of module 2 - Transport and Environment

Assoc. Prof. Kristýna Neubergová

Assoc. Prof. Kristýna Neubergová is a distinguished member of the Department of Transportation Systems at the FTS CTU. Holding the position of Manager for Projects, she has made significant contributions to the field of transportation and its intersection with the environment. Her teaching prowess is evident as she supervises a range of courses in both Bachelor's and Master's programs, including "Transport and Environment," "Applied Ecology," and "Landscape Ecology," to name a few. Additionally, she guides doctoral students on topics like "Aesthetics and Ecology of Transport Structures" and "Selected Environmental Issues in Transport."

Her research interests and publications span a wide array of topics. Some of her notable works include studies on clean mobility in road freight transport, the use of alternative energy sources in road freight transport, measures against smog in cities, and the impact of driving fluency on the economic and ecological aspects of transport. Assoc. Prof. Neubergová's dedication to understanding and addressing the challenges of urban mobility, especially in the context of environmental concerns, positions her as a leading voice in the field.

Lecturer of module 3 – Smart Mobility

Prof. Ondřej Příbyl

Prof. Ondřej Příbyl is a prominent figure at the Department of Applied Mathematics at CTU. As the Dean of FTS and holding multiple esteemed positions within CTU, including Chairman of the Scientific Council of FTS and Member of the Scientific Council of CTU, he has significantly influenced the academic and research direction of the institution. He is also a dedicated member of the Laboratory of Applied Mathematics in Transport and Logistics.

In the realm of teaching, Prof. Příbyl supervises and lectures on a variety of courses, with a focus on transportation planning, data processing in transportation, and the design of smart cities. His commitment to fostering the next generation of researchers and professionals is evident in his role as the head of student projects, notably one on "Digital twins for transportation in Smart Cities."

Prof. Příbyl's research contributions are vast and varied. His works delve into the intricate relationship between urban mobility and smart city design, addressing challenges such as CO₂ emissions, urban tunnel control, and the potential of cooperative and automated vehicles. With numerous publications in esteemed journals and conferences, he has established himself as

a thought leader in the field, particularly in understanding the interplay between transportation, technology, and urban sustainability.

Lecturers of module 4 – Traffic Surveys

Dr. Petr Kumpošt

Dr. Petr Kumpošt is a distinguished figure at the Department of Transportation Systems at FTS CTU. Holding multiple leadership roles, he serves as the Head of the Mobile Laboratory for Transport Analysis, Deputy Head of the Department of Transportation Systems, and is a Board Member of FTS. His affiliations extend to the Laboratory of Transportation Systems Safety, Mobile Laboratory for Transport Analysis, and the Mobile Measuring Laboratory.

As an educator, Dr. Kumpošt supervises and lectures in both bachelor's and master's degree programs. His expertise covers a wide range of topics, including traffic surveys, simulations, traffic models, and the practical aspects of road design and traffic operation.

In the realm of research, Dr. Kumpošt's contributions are significant. He has delved into areas such as the utilization of Google Traffic Data, ANPR data, and the theoretical modeling of slow vehicle travel times. His works have been presented in numerous conferences and journals, showcasing his commitment to advancing transportation systems and technology.

Ing. Petr Richter, Ph.D. Candidate

Ing. Petr Richter is an esteemed member of the Department of Transportation Systems at FTS CTU and serves as the Deputy Head of the Mobile Laboratory for Transport Analysis. As a Ph.D. candidate in the field of Transportation Systems and Technology, he is deeply involved in advancing the knowledge and understanding of transportation and telecommunications technologies.

His academic pursuits are under the expert guidance of Dr. Marek Kalika, and specialist supervision by Dr. Petr Kumpošt. Balancing his doctoral studies with a part-time teaching role, Richter imparts knowledge in traffic surveys, simulations, and the theory of road traffic operation to both bachelor's and master's degree students.

Richter's research contributions are noteworthy. With a focus on leveraging data for transportation insights, he has explored the potential of Google Traffic Data, ANPR data, and other innovative methods to assess and improve transportation systems. His works have been presented and published in various conferences and journals, solidifying his position as a rising thought leader in the field.

Lecturer of module 5 – *Navigating Climate Challenges: Urban Mobility and Resilience Strategies*

Dr. Ticiano Costa Jordão

Dr. Ticiano Costa Jordão is a distinguished project manager, researcher and lecturer at the Faculty of Transport Sciences. Since joining in September 2018, he has been instrumental in

forging new international partnerships and encouraging faculty members to participate in international project teams, especially within European grant schemes such as EEA & Norway Grants and Erasmus Key Action programs, and more.

His proactive approach is evident in his regular assistance in project proposal preparations, and he actively contributes with innovative ideas, particularly emphasizing environmental themes within transport sciences. This is showcased in his focus on environmental aspects of initiatives and the application of technologies in the realm of Smart Cities.

Dr. Jordão holds a degree in civil engineering from the Faculty of Civil Engineering of the Catholic University of Rio de Janeiro (Brazil) and a Ph.D. in Environmental Engineering from the Faculty of Chemical Technology of the University of Pardubice, Czech Republic. His academic journey includes a tenure from 2005 to 2014 at the Faculty of Economics and Administration at the University of Pardubice, where he wore multiple hats - from lecturer and researcher to Erasmus coordinator and project manager for European grants. He has also collaborated with international institutions such as the Faculty of International Relations at the Prague University of Economics and Business (VŠE) and the NOVA Information Management School in Lisbon.

A prolific speaker, Dr. Jordão has organized and lectured at numerous events worldwide, covering themes like climate change, renewable energy, and sustainable development. His publication record is extensive, touching upon environmental themes like climate change mitigation and adaptation, life cycle assessment in the aviation sector, GIS mapping for renewable energy sources, and more.

Over the past decade, he has imparted knowledge on these themes at universities and companies across countries like the Czech Republic, Brazil, Portugal, France, Spain, Mauritius, England, and Monaco.

In recent endeavors, Dr. Jordão taught a module on Urban Planning in the face of Climate Change as part of the RESICITIES project, which he coordinates. He was also a keynote speaker at the first International Conference on Smart Cities and Electric Mobility in Brazil as well as lecturer on the short course on Sustainable Strategic Planning for Urban Electric Mobility. He currently spearheads two significant projects:

- **SMARTEDUCG:** A bilateral collaboration between the Czech Technical University (CTU) and the University of Stavanger (UiS) aimed at enhancing academic synergy in climate change and smart cities. More about SMARTEDUCG: <https://smarteducg.fd.cvut.cz/>
- **RESICITIES:** An educational initiative for postgraduate students and academic staff across four European universities, focusing on sustainable, collaborative, and smart cities. More about RESICITIES: <https://www.resicities.eu>

His list of publications can be accessed here:

<https://www.researchgate.net/profile/Ticiano-Jordao>