Smart Cities and Urban Informatics (SCUI)
2023/2024

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Course of Study

Non-research track

The M.A. program consists of 39 credits over two consecutive semesters:15 credits are core courses, 10 credits are methods, 10 credits thematic courses. Four credits are from a seminar paper to be written in one of the courses indicated with an asterisk (*). Students are required to conclude all courses for credit with a grade based on either an exam or written paper.

Research track

The MA research track consists of 39 credits. Students accepted to this track are exempt from writing a seminar paper but need to enroll for the 'Personal Supervision' course (4 credits) in the second year of their studies. Note that writing the thesis itself does not count towards credits but the thesis grade comprises 35% of the final MA graduating score.

List of Courses

CORE COURSES (15 credits)

01502   GIS and Urban Informatics
Mr. Guy Keren
Geographical Information Systems (GIS) are at the core of all smart cities - that's what makes them smart. From collecting data through analyzing to presenting (smart) cities data, GIS is a principal component of all smart operations.In this introductory course, we will gain practical experience working with GIS software and elementary theoretical background of geoinformatics - the necessary tools for a wide variety of tasks.

| **Autumn Semester** | M | 13:00-15:00 | Social Sciences Bldg. | Lecture | **3 credits** |
| | M | 15:00-15:45 | | Exercise | |

01505   Urban Remote Sensing*
Prof. Noam Levin
The aims of this course are to familiarize the students with the world of remote sensing, and the capabilities it offers to map urban areas at various spatial and temporal scales, using satellite images. Specific topics we will cover will include mapping of impervious areas, vegetation and functional areas within cities. The students will learn some of the basics of

remote sensing, will become familiar with various datasets which are freely available, and at the end of the course will be able to conduct basic remote sensing analysis of urban areas.
Autumn semester   W   14:30-16:00   Social Sciences Bldg.   Seminar & Exercise **2 credits**

01507   Urban Planning: From Modernism to Urbanism and Smart Growth*
Prof. Eran Razin

Urban planning is a major component of urban dynamics and a field for the application of smart city tools. The course aims to introduce changing conceptions of urban planning and technological, economic and political transformations that explain them. It discusses changing conceptions, from visionaries such as Ebenezer Howard, Frank Lloyd Wright and Le Corbusier, to present day strategies of "neoliberal" planning, smart/sustainable growth and (new) urbanism, concluding with likely future trends in light of technological breakthroughs, global warming challenges and post- COVID-19 realities.
Autumn Semester   W   10:30-12:00   Social Sciences Bldg.   Lecture & Exercise **2 credits**

40996   Smart Cities: Technological and Social Aspects of Urban Innovation
Prof (Arch) Rafi Rich

Most people live in urban areas today. With a strong immigration trend to cities, along with the growing population, more than 65% of humanity is expected to live in cities by 2050, setting a new set of disturbing challenges. The information revolution, accompanied by the developed technologies of recent decades, introduces a new concept: the smart city. In this course, we will define that term and discuss further aspects and implications of future cities on human social, economic, and environmental systems.
Autumn Semester   W   16:30-18:00   Social Sciences Bldg.   2 credits

01552   Social Justice and Smart Cities
Dr Rani Mandelbaum

This seminar course aims to give students tools to investigate spatial justice practices and policies in cities, with a focus on housing, transport and public spaces. Student teams investigate good practice case studies from cities around the world and explore the potential for adaptation of these practices in Jerusalem or elsewhere. Course methods are based on readings, peer learning, class discussion and team projects.
Spring Semester   M   17:00-18:30   Social Sciences Bldg.   Seminar **2 credits**

01516   Field Course: Transitioning to Smart City Growth: Jerusalem: between Tradition and Innovation
Dr Na'amah Hagiladi

The Smart City agenda has evolved over the past decade, focusing on citizens' needs using digital tools and technologies to support sustainable urban growth. In this course, we will look closer into a 5000-year-old city facing modern world challenges – Jerusalem. The course will combine excursions and meetings with municipality officers, and as such, it will take place at both the University and the Jerusalem Municipality.
Autumn semester   M   08:30-10:30   Social Sciences Bldg.   Lecture   **2 credits**

01551 Seminar in Smart Cities*
Prof. Daniel Felsenstein

This seminar course will provide students with the tools and methods for conducting independent research into smart cities topics. It will integrate issues of data generation, research methodology and analytic tools to equip students with the skills for researching smart cities. The course format will include both lectures, student presentations and hands on exercises. The course provides the methodological and practical infrastructure for writing a seminar paper.
Autumn semester   W   12:30-14:00   Social Sciences Bldg. Seminar   **2 credits**

METHODS AND TOOLS (10 credits)

01508 Python Programing
Dr Royi Zidon
This is a practical hands-on course for students with no previous programming background. We will focus on practice and the lecture will be accompanied by exercise and a weekly homework will be assigned.
Autumn Semester M 10:30-12:00 Social Sciences Bldg. Lecture **2 credits**

01517 Machine Learning applications for Smart Cities
Dr Royi Zidon
In the context of smart cities, machine learning algorithms can be used to analyze vast amounts of data generated by various sources such as sensors, cameras, and social media to provide insights and optimize services. This course explores different techniques for analyzing urban data to improve predictions for solving problems such as traffic congestion and energy consumption. We will cover data preparation and analysis using various ML methods. Students will gain familiarity with data analysis and various machine learning methods and learn how to apply MLalgorithms to urban data for problem-solving purposes.
Prerequisite for course 01517: *Completion of course 01508 and/or prior knowledge of Python Programing*
Spring Semester M 10:30-12:00 Social Sciences Bldg. Lecture **2 credits**

01521 Urban Simulation*
Dr Yair Grinberger
Cities are complex dynamic systems in which individuals, households, infrastructure, and governmental institutions constantly interact. This complexity makes it hard and at times impossible to assess the outcomes of changes within the system. In such cases, simulations based on computational urban models can be used to gain insights and intuition regarding the dynamics of urban systems under various conditions. In the course "Urban Simulation", the students will gain both the theoretical knowledge required for understanding how urban simulations are developed and used and the practical know-how required for developing such simulations using Python language programming.
Spring Semester W 10:30-12:00 Social Sciences Bldg. Lecture **2 credits**

40994 Data Project: Data for Managing the Smart City*
Dr Amit Birenboim
n this project-based course students will have the opportunity to apply a suite of analytical tools (both tools acquired in other courses and new tools that will be thought and practiced in the current course) to problems dealing with the management and functioning of the city. These can deal with the delivery of municipal services, the management of city infrastructure, the efficient use of city resources and the monitoring of intra-urban mobility.
Spring Semester W 14:30-16:00 Social Sciences Bldg. Lecture 2 credits

01649 Data Analytics for Urban Policy
Dr Talia Kaufmann
This course will introduce students to the tools and practice of data analytics for researching urban and regional policy issues. The course will illustrate the types of new data available for analyzing cities and demonstrate how these can be harnessed to measure and investigate spatial, social and economic urban phenomena with the goal of informing decision makers
Spring Semester M 13:00-14:30 Social Sciences Bldg. Lecture 2 credits

THEMATIC COURSES (10 credits)

01533   Urban Innovations and Sustainable Mobility Ecosystems
Dr Maya Ben Dror

The application of information revolution in mobility, from autonomous to on-demand travel and delivery, disrupts urban mobility, erodes governing policies, and generates rich data. This course examines the utilization of and attitudes towards new mobility and its incorporation in urban transportation policy - increasing urban sustainability and resilience. Students of this elective will learn how skills, methods and tools gained through core courses can be applied in urban policy environments, partially through real world experiences of guest speakers from leading companies, public and non-profit organizations.

Condensed course, will be taught both in class and on-line

Spring Semester   M   10:30-12:00   Social Sciences Bldg. Lecture **2 credits**

01524 Smart Transportation Systems
Eng. Jay Kaplan

The Smart Transportation Systems course will introduce students to the main elements of smart transportation systems, focusing on planning principles, technological and systems approaches, and institutional aspects. The course will provide students with the knowledge and tools for evaluating and discussing the impact of various technologies, applications and services. Students will be presented with the evolving state of the art and with a survey of success stories in world cities. We will have the opportunity to explore tools for the use of big data and modeling in improving planning decisions. We will discuss the challenges and opportunities that smart transportation systems present for the future of urban planning.

Autumn Semester   M   17:00-18:30   Social Sciences Bldg. Lecture **2 credits**

40995 Quality of Life in the Smart City*
Dr Amit Birenboim

Quality of life, health and wellbeing have become a central concern for local policy makers in recent decades. In this course, we will address these issues from both theoretical and empirical perspectives while focusing on the ways by which technology and data can promote the quality of life of urban inhabitants. Each topic that will be covered will include a theory class that will be followed by a practical exercise.

Spring Semester   M   15:00-16:30   Social Sciences Bldg. Lecture **2 credits**

01683 Making the City Smart: Topics in Urban Transformation
Dr Ronit Purian

This course will introduce students to various cutting edge issues in smart city development. Through a series of guest lecturers. students will become acquainted with the following topics: the Circular Economy, Data Governance and Data Confidentiality in the Smart City, Smart Urban Energy Systems, Digital Tourism, Smart municipal service delivery, Blockchain technology and Smart Cities- enabling technologies, Smart water/sewage/waste systems

Spring Semester   W   12:30-14:30   Social Sciences Bldg. Lecture **2 credits**

40997 Integrative Smart Cities Project

The city of the 21st century has seen a rapid evolution, from a city with stable growth to a complex built environment affected by environmental, social and economic stress, together with the effects of technology and data that have made optimization, engagement and management easier and more dynamic. To achieve the potential brought to us by tech and data, a city needs to see data and technology as a new infrastructure level. This course will explore the components of this new infrastructure level, its uses, as well as barriers and hazards due to misuse or wrong distribution

Spring Semester   W   16:30-18:00   Social Sciences Bldg. Lecture **2 credits**

Program is subject to change

* Course in which students can write a seminar paper.