Федеральное государственное образовательное учереждение высшего профессионального образования
«Национальный исследовательский университет "Высшая школа экономики"»

Подразделение «Высшая школа урбанистики»
в сотрудничестве с Институтом Медиа, Архитектуры и Дизайна «Стрелка»

Направление подготовки
«Градостроительство»
Степень (квалификация): магистр

ПРОГРАММА
«ADVANCED URBAN DESIGN»
«ПЕРЕДОВЫЕ ПРАКТИКИ ГОРОДСКОГО ПРОЕКТИРОВАНИЯ»

Аннотация учебной дисциплины
«Metropolitan Data»
«Спонтанные городские данные»

Шифр направления 07.04.04

Москва, 2016

Metropolitan Data

Title of the Course: Metropolitan Data

Duration: second semester

Type: non-mandatory

Author/lecturer: Philipp Kats, Ekaterina Serova

Invited speakers: TBC

1. GENERAL DESCIPTION

In decades past we have seen multiple disciplines—sociology and linguistics, for instance—change significantly under the influence,and with the help of, the rapid development of computer science. Today, as technology has finally conquered our big cities, it offers new possibilities while presenting new challenges.

It is now the turn of Urban Planning, Management, and Design to be rethought through new technologies. As the whole institution of urban management and governance is based on data-driven decisions there is enormous potential for an urban technological revolution. Data classification and analysis benefit immensely from the advantages which contemporary technology affords. It is, therefore, very important that urban professionals understand fundamental technological concepts, and learn how to deal with their potential limitations and 'bottlenecks' on a daily basis.

This course will provide basic knowledge on information technologies, techniques, and the practicalities of contemporary urban informatics to students who do not have a specific technical background, helping them to use informatics in order to solve complex problems in the city. It is a case-based course which requires general analytical skills and the ability to think critically.

Methodology

Formats

The course will be delivered in the form of lectures, practical seminars and group discussions, group and individual research projects, and a short essay.

Lectures

Lectures will cover key topics with a focus on related research projects and real-world examples. Several guest speakers, professionals and technology experts will be invited to give a talk.

Seminars

Practical seminars will help articulate topics introduced in lectures in order to ignite discussion about relevant academic papers and publications.

Blog

As part of the course, students will publish an article (post) each week on a student blog, covering radical urban innovations and project solutions related to the subject of the course. Later, students will discuss these posts in the form of peer-to-peer reviews.

Problem sets

Students will be asked to deliver several collective research assignments on the topic of Metropolitan Data which are aimed at performing practical data analysis as part of the research – from data search and processing to analysis and conclusions.

Final project

The final project is an individual research paper, of no more than ten pages, covering one (of the many) urban problems cities around the world are presently struggling with. This paper can become part of the Master's thesis and will help in performing data analysis for the research-based design project.

Main goals of the course

The main goals of the course are:

- To broaden students' understanding of the principles of information design and management
- To provide basic knowledge of urban information sources and flows
- To explain how information is used in city management and decision making, both on macro and micro levels
- To demonstrate ways in which to search for technological solutions, and to be able to estimate both the opportunities and challenges those technologies might bring to the city

After successful completion of the course, the students will know and be able to:

- understand the theoretical framework of urban informatics
- navigate the world of modern information technologies, understanding their strengths and constraints
- understand ecosystems of urban data and the technical aspects of data collection and analysis

- choose the right data sources and techniques for data-driven urban research and decision-making
- speculate about prospective innovations and their potential

Multidisciplinary Approach

The course does not require any specific knowledge or skills. It will focus on the broader image of the informational shift in urban management and policies, connecting to a wide range of disciplines and subjects from demographics, poverty and inequality, to transportation and operations research.

Connections to other courses and project modules of the Program

Apart from being a logical continuation of the 'Access to Knowledge and Data' course, Metropolitan Data does not have a direct connection to other courses. Nevertheless, its final project assignment can be used further as an analytical part of program thesis and the 'Research by Design' course project.

Specific Requirements

The course is lecture based and does not require any specific technical skills.

2. STRUCTURE AND THEMATIC COMPOSITION

The course provides a general overview of the field of urban informatics for designers and researchers who do not have a technical background. It focuses on the large spectrum of technological applications and the analysis of their impact on the urban environment, covering six differing domains:

- Speculative Design
- Complexity and the science of cities
- Smart Cities
- Spontaneous data
- Data-driven decision making, stochastic modelling, and risk management
- Data Science

While covering quite a wide range of topics, Metropolitan Data introduces them in broad strokes and offers guidelines for further investigation of the technological revolution that reshapes the ways in which contemporary cities work and grow.

Thematic Structure

Hours per theme

Theme 1. Speculative Design

Total hours: 12
Lectures: 4
Seminars: 4
Individual Workload, hours: 4

Theme 2. Complexity and the science of cities

Total hours: 10
Lectures: 4
Seminars: 2
Individual Workload, hours: 4

Theme 3. Smart Cities

Total hours: 12
Lectures: 4
Seminars: 4
Individual Workload, hours: 4

Theme 4. Spontaneous Data

Total hours: 8
Lectures: 2
Individual Workload, hours: 6

Theme 5. Data-Driven Decisions

Total hours: 12
Lectures: 4
Seminars: 4
Individual Workload, hours: 4

Theme 6. Data Science

Total hours: 12
Lectures: 4
Seminars: 4
Individual Workload, hours: 4

2.1.2 Themes per week

Week 1: Speculative Design
Week 2: Complexity and the science of cities
Week 3: Smart Cities
Week 6: Spontaneous Data
Week 7: Data-driven decisions
Week 9: Data Science

3. COURSE CONTENT

Speculative Design

Tutors: Philipp Kats, Ekaterina Serova

Speculative Design is a contemporary design movement which works towards possible technological and social challenges, rather than reacting to existing ones. As technology rapidly changes the world around us, often changing things we least expect to be affected, this approach is useful in estimating the effects of future innovations and technical solutions to city problems.

- Innovation and innovation cycle
- How technology shapes the city – direct and indirect ways
- Speculative Design and critical engineering

Educational Formats

- lectures
- seminar
- problem set
- blog post
-

Practical Assignment

Students will be required to:

- select a topic in groups and create a coherent slideshow presentation (speculation) of the potential ways in which particular technologies might affect cities
- create a blog post (covering the presentation)

Bibliography

- Dunne, A., & Raby, F. (2013). *Speculative everything: design, fiction, and social dreaming*. MIT Press

- Oliver, Savičić, Vasiliev, *Critical Engineer Manifesto*, 2011-2015, criticalengineering.org
- Winy Maas, *Skycarcity: A Pre-Emptive History*, Actar, 2007

Complexity and the Science of Cities

Tutor: Philipp Kats

'Science of Cities' is a new science which looks at cities as integrated systems with certain generalizable features and properties. This movement came to be known after a famous paper by Geoffrey West and Luis Betancur, published in *Nature* magazine under the title 'A Unified Theory of Urban Living".

- Complexity and emergent properties
- City as a system
- System approach / system's properties
- New science of cities

Educational Formats

- lectures
- seminar

Practical assignment

Students will be required to create a blog post on the topic, discussing particular aspects and/or applications of the Science of Cities.

Bibliography

- Batty, M. (2013). *The new Science of Cities*. MIT Press
- Bettencourt, Luis, and Geoffrey West. *A Unified Theory of Urban Living*. Nature467, no.7318 (2010): 912-913.
- Downey, A. B. (2012). *Think Complexity: Complexity Science and Computational Modelling.* O'Reilly Media, Inc.

Smart Cities

Tutor: Ekaterina Serova

'Smart City' is a well-known and widely used term which stands for a variety of urban phenomena and technologies used in cities, all having similar feature: data-driven centralization. The concept of a Smart City appears to be, in one sense, a logical continuation of Modernist

ideas but instead represented by international corporations. This block of lectures and seminars will help to understand the pros and cons of the concept and critically assess its popularity.

- urban management
- smart infrastructure
- Smart Cities around the world

Educational Formats

- lectures
- seminar

Practical assignment

Students will be required to create a blog post on the topic, discussing particular cases and/or applications of Smart City technologies

Bibliography

- Greenfield, A. (2013). *Against the Smart City*.

- Schaffers, H., Komninos, N., Pallot, M., Trousse, B., Nilsson, M., & Oliveira, A. (2011).

Smart Cities and the Future Internet: Towards Cooperation Frameworks for Open Innovation.

Future Internet Assembly, *6656*, 431–446.

- Shapiro, J. M. (2006). Smart cities: quality of life, productivity, and the growth effects of

human capital. *The Review of Economics and Statistics*, *88*(2), 324–335.

- Townsend, Anthony M. *Smart Cities: big data, civic hackers, and the quest for a new*

utopia. WW Norton & Company, 2013.

Data-Driven Decisions

Tutor: Ekaterina Serova

The value of any data is estimated by the effect it makes on our plans and decisions – the skill, therefore, of using the most of data. The lecture covers the main approaches of optimisation and risk modelling with the use of modern computational tools.

- optimisation and efficiency frontier

- stochastic modelling and risk management
- simulation and Monte-Carlo approaches
- application in urban management

Educational Formats

- lectures
- seminar
- student blog

Practical assignment

Students will be required to: solve a set of optimisation problems, define an urban optimisation/risk problem for Moscow, in groups, and make an attempt to solve it using data and available information

Bibliography

- Larson, R. C., & Odoni, A. R. (1981). *Urban Operations Research*.

- Jayakrishnan, R., Mahmassani, H. S., & Hu, T.-Y. (1994). An evaluation tool for advanced traffic information and management systems in urban networks. *Transportation Research Part C: Emerging Technologies*, *2*(3), 129–147.

- Jha, A. K., Bloch, R., & Lamond, J. (2012). *Cities and flooding: a guide to integrated urban flood risk management for the 21st Century*. World Bank Publications.

Data Science

Tutors: Philipp Kats, Guest speaker (TBC)

Data Science is perhaps the 'hottest' discipline of the recent years. Although practical application of most statistical and machine learning techniques requires a general background in statistics, it is important to understand the basic concepts of Data Science; the potential of its application to urban subjects is astonishing.

- probability
- regression and clustering
- supervised and unsupervised Machine Learning
- application

Educational Formats

- lectures
- seminar

Practical Assignment

Students will be required to: perform an exploratory analysis of the dataset, create a blog post over the topic, discussing particular data science technique and it's implementations in urban studies

Bibliography

- Anderson, C. (2008). *The End of Theory: the data deluge makes the scientific method obsolete.*
- Batty, M. (1976). *Urban Modelling: algorithms calibrations, predictions*. Cambridge ; New York: Cambridge University Press.
- Smoke Signals - Reducing Fire Deaths With Public Data. (n.d.). Retrieved January 14, 2016, from http://labs.enigma.io/smoke-signals
- Hidalgo, C. A., & Castañer, E. E. (2015). Do we need another coffee house? The amenity space and the evolution of neighborhoods. *arXiv Preprint arXiv:1509.02868*.
- Freeman, L., & Braconi, F. (2004). Gentrification and Displacement New York City in the 1990s. *Journal of the American Planning Association*, *70*(1), 39–52.

Spontaneous Data

Tutor: Ekaterina Serova

'Spontaneous Data' is the term that refers to a special kind of big data: the verbose data created by users of numerous social networks and services. Among other specific properties of Spontaneous Data are near-real time feed, textual representation, incompleteness, and a lack of structure or defined topic. Despite it's various problems, Spontaneous Data has large potential as a source for real-time analysis, event-detection and prediction, addressing social issues, health and crime topics.

- spontaneous data

- sources and apis
- real-world examples
- flaws and limitations

Educational Formats

- lectures
- seminar

Practical Assignment

Students will be required to perform exploratory analysis of the dataset, create a blog post on the topic, describing the particular case of Spontaneous Data implementation.

Bibliography

- Castells, Manuel. *Rise of the Network Society.* 2nd edition. Oxford: Blackwell: 2000
- de Lange, Michiel, and Martijn De Waal. *Ownership in the Hybrid City*. (2012).
- Cranshaw, J., Schwartz, R., Hong, J. I., & Sadeh, N. M. (2012). *The Livelihoods Project: Utilizing Social Media to Understand the Dynamics of a City.* In *ICWSM*.
- Ratti, C., Sobolevsky, S., Calabrese, F., Andris, C., Reades, J., Martino, M., … Strogatz, S. H. (2010). *Redrawing the map of Great Britain from a network of human interactions*. *PloS One*, *5*(12), e14248.

4. GRADING

Explanation of the grading system

Overall grade will be calculated as a summary of articles below:

- Participation in a blog - 20 %
- Homework - 50 %
- Final project - 30 %
- Extra credit assignment - 10%

Description of the intermediate check-ins and of the final exam.

Student Blog

Each student is expected to join the course's collaborative blog. On a weekly basis students are required to publish a post on urban data-driven innovations, connected to the topic of the week's lecture.

Homework

Several homework assignments will be presented during the course. Each should be submitted in a form of a slideshow presentation or a paper, either individually or in groups.

Final project

Final project is a research paper on a data-related city problem. Final research might (and should) be connected to the thesis work on 'Research-based Design' course project.