Future Cities & Regions Specialization
Urban Futures
Syllabus

Alexandre HEDJAZI
Matteo TARANTINO

1. Course at a glance:

- 12 credits
- 136 hours (96 classwork; 40 fieldtrip)
    - 12 weeks/8 hours each + 1 week fieldwork (40 hours).
- Integration with MOOC
- Collaborations with Geneva Airport, UNEP, GRID.
- Faculty: Alexandre Hadjazi, Matteo Tarantino

2. Course objectives

- Introducing students to key concepts, challenges and opportunities of Urban Sustainability.
- Solution-based teaching methods towards sustainability transition.
- Multi-site competency-building.
- Framing critical infrastructures as infra-systems.
- Teaching hands-on data collection in complex scenarios in partnership with real-life institutions (GVA Airport).

3. Expected competencies

- Multiple definitions and theoretical frameworks: Understanding the application of concepts and theories.
- Develop connections between built and natural environment.
- Critical thinking about the challenges & promises of 'quantifying and measuring sustainability.'
- Scaling (up) Urban Sustainability (from neighborhood to metropolitan area) through critical infrastructure systems (i.e. Airports).
- Airports as illustrations of critical infrastructures in transition. How these infrastructures participate (including impeding) in the transition towards urban sustainability.
- Understand the relationship between population and a city's sustainability agenda:
    - How to best connect those agendas and anchor them in permanency?
    - How to make them implementable?
    - How to evaluate related projects

4. Student Outputs and Evaluation

- *Individual work (50%):*

- o Presentation and discussion of assigned readings throughout the course.
  - o Blog posts during and after fieldtrip, combining elements of theory with field observations about Beijing airport development.

- *Group work (50%):*
  - o Data collection, using GVA airport's own sensors and collaborating with GVA Innovation Department towards new forms of measuring sustainability in airports.
  - o Based on data collected, work in small groups and present an element of the critical infrastructure sustainability strategy. Design, and possibly test, an acceptable way to measure it. Show the connections or mismatch with the city/ canton's sustainability plan (e.g. Climate plan / waste management etc.). Revise according to feedback from experts.

5. Description of activities

Classroom activities are divided in three large blocks, each comprising four weeks. Alexandre Hedjazi (AH) will focus on the urbanistic part, while Matteo Tarantino (MT) will focus on the data collection/management element as well as the hands-on activities.

<table>
<tr><th></th><th></th><th>Classwork Activities</th><th>Mandatory Readings</th><th>Supplementary Materials</th></tr>
<tr>
<td rowspan="2">Block 1: Theories of Sustainability and Data Management</td>
<td>week 1</td>
<td>AH: SDGs, urban development and sustainability. How Sustainable Development Goals are informing the new wave of sustainable policy portfolios and integrated solutions.

MT: Measuring Human Experiences: introduction to the issues and perspectives in the quantification of complexity.</td>
<td>1) CITISCOPE (2017). What is the New Urban Agenda? http://citiscope.org/habitatIII/explainer/2015/06/what-new-urban-agenda
2) Bond, A.; Morrison-Saunders A. & Pope, J. (2012) Sustainability assessment: the state of the art, Impact Assessment and Project Appraisal, 30:1, 53-62, DOI: 10.1080/14615517.2012.661974</td>
<td>1) BBC Videos "Hot Cities": Dhaka (Bangladesh); la Havana (Cuba); Lima (Peru); Los Angeles (USA); Jakarta (Indonesia)
2) OECD (2015): The Metropolitan Century: Understanding Urbanization and its Consequences. Paris: OECD</td>
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<td>week 2</td>
<td>AH: Cities & Natural Capital: how do cities factor environment as value and capital rather than risk and source of uncertainty.

MT: Theories and tools of data extraction.</td>
<td>1) Natural Capital Coalition. (2015) Natural Capital Protocol Framework.
2) Web data extraction, applications and techniques: A survey. Knowledge-Based Systems. Volume 70, November 2014, Pages 301-323</td>
<td>1) Natural Capital: It's Smart to Start with Cities. Environment Journal. Sep 2016; 2) Habits III – The New Urban Agenda. Draft outcome document. UN Conference on Housing and Sustainable Urban Development.</td>
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	week 3	AH: Urban Form and Sustainability: Case presentation on Urban Form and Sustainable Retrofitting; How the way cities are planned and grow affects their ability to implement any sustainability agenda.	1) Jenks, M. (2005). City form: The Sustainable Urban Form Consortium. Oxford Brookes University. 2) Edwards, P. (2009). A Vast Machine. MIT Press. Chapter 11, "Data Wars."	1) Lynch, K. (1960) The City Image and its Elements. The Image of The City. MIT Books. 2) Storper, M. (2014). The Nature of Cities: The Scope and Limits of Urban Theory. International Journal of Urban and Regional Research.
		MT: Data Quality and validation: issues of interoperability in complex systems; how good data-collection and data-management practices lessen criticalities.		
	week 4	AH: Urban Infrastructures and Ecological Footprints; How urban critical infrastructures, due to their scale and scope of operation and land use and ecological footprint, impact the mitigation and adaptation capacities of cities transitioning towards sustainability;	1) US. Department of Energy (2012). Climate Change, Infrastructure, Urban Systems and Vulnerabilities. Pp. 21-47 2) Longhurst, J. (2005). 1 To 100: Creating an Air Quality Index in Pittsburgh. Environmental Monitoring and Assessment, 106(1), 27-42. doi:10.1007/s10661-005-0758-x	1) Lempert, R. (2016), Infrastructure design must change with climate. RAND Corporation, August 2016.
		MT: The Politics of Environmental Data: how planning, measurement and storage of environmental data correlates with political, economic, technological and social stakeholders.		
Block 2: Airports as Critical Infrastrucutres and Measuring their Sustainability	week 5	AH: Sustainability and Travel Infrastructure: The case of airports. Paradigms, Metrics, and perspectives. Transforming the movement of people and fret to minimize negative externalities. How airports think sustainability and measure its dimensions. Guest Lecture by ICAO (TBD).	1) Geneva Airport Sustainability Report (2016). http://www.gva.ch/en/DesktopDefault.aspx/tabid-98/41_read-1364/ 2) Upham, P. J., & Mills, J. N. (2005). Environmental and operational sustainability of airports: Core indicators and stakeholder communication. Benchmarking: An international journal, 12(2), 166-179.	GRI (2011) Sustainability Reporting Guidelines & Airport Operators Sector Supplement. https://www.globalreporting.org/resourcelibrary/G3-1-English-Airport-Operators-Sector-Supplement.pdf
		MT: Introduction to the Geneva Airport data experience: Understanding GVA data flows, sensor networks, needs and expected outcomes. Guest Lecture by Geneva Airport Innovation Lab (Hamidul Huq).		

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<tr><td colspan="4" style="background:yellow">1 WEEK FIELDTRIP TO Beijing Airport. Field activity, observation, preliminary modeling about a large-scale airport sustainability strategies and measures. Details TDB with Tsinghua Univ.</td></tr>
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	week 6	AH/MT: Transportation and Airports. How airports attempt to maximize and optimize passengers flows and how this impacts their sustainability strategies.	TBD	TBD
		MT: Hands-on measuring of GVA transportation flows. Looking for new, innovative ways to quantify how people reach, transit through and leave the airport.		
	week 7	AH Energy in Airports & Energy efficiency; Diversifying energy mixes while moving towards renewable energy. Guest Lecture TBD.	TBD	TBD
		MT: Hands-on measuring Energy in Airports. Understanding available data from GVA and looking for novel strategies to assess the energy consumption of the various parts of the airport.		
	week 8	AH/MT Emissions and Airports: Air emissions, water emissions, waste in airports; Issues of multiple stakeholders and standards. Guest Lecture by GVA Sustainability Department.	TBD	TBD
		MT: Hands-on measuring emissions in airports. Understanding available data flows, sensor placement, and exploring new ways to measure (and manage) waste in airports.		
Block 3: Modeling, Data Analysis	week 9	AH/MT: Modeling airport sustainability: transforming data into SDGs measures. Students will engage in hands-on modeling. Guest lecture from UNEP (Gu Beibei, Fulai Sheng).	TBD	TBD
	к ө	MT/AH: From model to	TBD	TBD

		actionable: sustainability policymaking. Students will engage in hands-on drafting of policy recommendations. Guest lecture from GRID (name TBD).		
	week 11	Presentation to GVA Representatives of the models, (potentially new) measurement methods, and policy recommendations	None.	None.
		Discussion and Incorporation of feedback into student's work. Review of data and methods. Benchmarking.		
	week 12	Final presentation of collected data (and related techniques), models, recommendations and perspectives by the students.	None.	None.
		Conclusion of the course.		